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USSR Report

TRANSPORTATION

No. 17

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AIR

FUEL ECONOMY PROPOSAL REVEALS INFORMATION ON TU-134 AIRPLANE ENGINE

Moscow VOZDUSHNYY TRANSPORT in Russian 13 May 80 p 2

[Article by V. Borodenko, senior flight engineer examiner at the Ul'yanovsk Civil Aviation Training Methods Center: "The Cost of a Year's Coordination"]

[Text] The economy of fuel and material resources is a problem of paramount importance for all enterprises in civil aviation, and therefore it is necessary to investigate all possible methods of using these resources carefully. A great deal of fuel and many hours of TU-134 aircraft engine service life could be saved at the Ul'yanovsk Order of Lenin School of Advanced Flight Training if we were permitted to execute take-offs and go-arounds at the engines' nominal rated power when performing training and practice flights.

The TU-134 aircraft has a high power-to-weight ratio. At temperatures of 12° and lower it remains practically constant. This occurs because, at such temperatures, the engines operate in a limited take-off regime and their thrust remains constant. At temperatures above 12° the engines operate at constant peak r.p.m. In this case, the temperature of the outgoing gases remains practically constant, while the thrust decreases due to a reduction in the air mass flow rate and the degree to which the air is compressed by the compressor. Thus, at temperatures of 12° and lower, when the atmospheric pressure is close to normal and when the length of the runway is 2,500 m or more, the execution of a take-off or a go-around at nominal rated power during training and practice flights insures the complete safety of the take-off.

The State Scientific Research Institute of Civil Aviation also considers that take-offs in the TU-134 at nominal rated power is entirely feasible. In 1974, when I first addressed the editorial board of GRAZHDANSKAYA AVIATSIYA with such a proposal and enclosed the necessary substantiation, I received a reply from the State Scientific Research Institute of Civil Aviation stating that the question which I had posed was an urgent one, and that tests in this area were being conducted. More than two years went by, but my question still had not been decided. In 1976 I again addressed this question to the State Scientific Research Institute of Civil Aviation. I will cite the reply verbatim: "At the State Scientific Research Institute of Civil Aviation the question of using nominal rated power in the execution of practice flights was worked out long ago. At the institute special flight tests of TU-154 and TU-134 aircraft were conducted and recommendations were developed for introduction into the Flight Operations Handbook. These recommendations provided for the use of nominal rated power on take-offs and go-arounds for TU-134 and TU-154 aircraft. At the present time these recommendations are being coordinated at the Public Design Bureau and will subsequently be introduced. The take-off procedure with the application of nominal rated power, in addition to the economic effect, provides an even more accurate imitation of take-offs with heavy loads."

The reply was dated 14 September 1976. From the reply, it follows that the question really was urgent and was almost decided. However, 1980 has already begun, and, as usual, we waste about 500 tons of fuel yearly and, as usual, we use up the service life of the TU-134 engines three times faster than is normal. Each time the engine is brought up to the take-off regime "costs" the engine one hour of service life. As it turns out, bringing the TU-134's engines up to the take-off regime uses up the service hours available to us, whereas the actual running time in hours comprises only about 30 percent of the prescribed (between-repair) service life. That is, the frequency of engine replacement and repair is three times as great. One need only be reminded that a TU-134 engine costs 75,000 rubles and that the school must replace dozens of them yearly.

Moreover, due to a shortage of engines, one or two aircraft at the school are always out of service. It is not difficult to see what great losses the school and the State must bear each year just because the question of using nominal rated power instead of take-off power has taken more than three years to coordinate.

Why, then, is it taking so long to decide this urgent question, especially if one considers that the TU-134 has been flying for 13 years?

To the State Scientific Research Institute of Civil Aviation's credit, this question has already been decided for the TU-154, and we hope to receive in the very near future a change in the TU-134's Flight Operations Handbook that will allow us to execute take-offs and go-arounds at nominal rated power while performing flights.

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MOTOR VEHICLE

COMMERCIAL, PRIVATE USES OF MOTOR VEHICLES OUTLINED

Ukrainian Minister

Kiev RABOCHAYA GAZETA in Russian 17 May 80 p 1

[Interview with UkSSR Minister of Automotive Transport Fedor Petrovich Golovchenko by a RATAU correspondent: "Give Automotive Transport a Precise Rhythm"]

> [Text] More than 20,000 plants, factories, construction projects and organizations and thousands of kolkhozes are being served by UkSSR Minavtotrans [Ministry of Automotive Transport] automotive enterprises. They carried out the plan for the first 4 years of the five-year plan in hauling volume and the other most important technical and economic indicators. A RATAU [Radio-Telegraph Agency of the Ukraine] correspondent asked UkSSR Ministry of Automotive Transport F. P. Golovchenko to tell about the components of this success and about the measures that are being taken to provide a precise rhythm for the transportation conveyor.

[Question] As is known, the amount of motor-vehicle hauling in the republic is growing steadily. What are the branch's workers doing, Fedor Petrovich, to solve the new tasks successfully?

[Answer] Despite the fact that we now have to haul 35 million more tons of freight than last year, the plan for the first quarter has been carried out both for the ministry as a whole and for all oblast automotive freight-transport administrations. Integrated socialist competition for a worthy greeting to the 110th anniversary of the date of birth of V. I. Lenin helped very much. Workers of the Voroshilovgradskaya, Dnepropetrovskaya, Zaporozhskaya and other oblast administrations achieved excellent successes during the labor drive to carry out the decisions of the November 1979 CPSU Central Committee plenum.

A further rise in automotive transport utilization effectiveness will be achieved by increasing the amount of haulage planned on the basis of scientific recommendations derived from the use of an ASU [automated control system]. The centralized dispatch of freight, the share of which has already reached 89 percent--the level planned for the end of the five-year plan--is being effected on an ever-increasing scale. The gains from this method are two-fold: we free freight shippers and recipients from functions that are not inherent in their jobs and from additional expenditures, and, on the other hand, we use transport resources with a more complete yield. It strengthens creative collaboration with our related activities. Collective forms for organizing work, particularly the brigade contract, are being improved. More than 800 brigades are now working under this method at common-carrier automotive transport enterprises. Their output per vehicle is higher and nonproductive idle vehicle time and fuel consumption are lower than those of other brigades. The brigades of Heroes of Socialist Labor Z. V. Gorbonos, A. G. Ivanenko and G. N. Meshcheryakov are rightfully considered to be the example-setters.

[Question] It was pointed out at the December 1979 plenum of the Ukrainian Communist Party Central Committee that UkSSR Minavtotrans is obligated to develop more actively the service that supports intercity hauling, and to use much better the potential of the vehicles that belong to other agencies for hauling incidental freight.

[Answer] Yes, CPSU Central Committee Politburo member and Ukrainian Communist Party Central Committee First Secretary V. V. Shcherbitskiy spoke about this in his report. Based on nationwide expediency, the republic is adopting the policy of creating a unified transport system for carrying out intercity (interoblast) and interrepublic freight hauling. The minister is taking important steps aimed at improving the organization and use of automotive transport and will, in particular, undertake the hauling of that freight whose shipment by rail transport is recognized as irrational. He is also striving to reduce empty runs of motor vehicles, loading them up regardless of their departmental subordination. For this purpose, nine more fixed facilities for the monitoring and control of the incidental loading of automotive transport are to be created. They will be established in Kiev, Voroshilovgrad, Donetsk, Nikolayev, Khar'kov, Odessa and other oblast centers.

The valuable initiative of the workers of the Zaporozhskaya Oblast Automotive Freight-Transport Administration, who are working under the slogan, "Prevent empty runs by automotive transport," deserves attention. The initiative of the Zaporozh'ye personnel is being actively supported by many automotive enterprise collectives.

[Question] What is being done to improve passenger service?

[Answer] The republic's automotive transport gives high priority to meeting the workers' needs for hauling. More than 21 million people use its services daily. In considering this, major attention is being paid to strengthening the operating-equipment base, for whose development many funds are appropriated. Thus, new bus fleets are going into operation in Kiev, Krivoy Rog, L'vov, Sevastopol' and Odessa in 1980. A modern bus terminal will be turned over for operation in L'vov. It is planned that about 80 automotive fueling stations will be built in the concluding year of the five-year plan.

The bus fleet is being augmented by more modern models of vehicles. The number of taxis in cities is being increased by almost 4,000, of which 300 are to be equipped with radios. The express-bus network will be further developed, primarily on suburban routes and resort-zone routes.

A system of centralized traffic control whose creation is being completed in many oblast centers and large cities will help to promote regularity in the operation of automotive transport. ASU's in Kiev, Donetsk, L'vov and Simferopol' will be turned over for industrial-test operation this year.

[Question] How are preparations for automotive passenger transport for Olympiad-80 progressing?

[Answer] It is assumed that Kiev will be visited by more than 27,000 foreign and Soviet tourists during the Olympic Games. Eight hundred buses and 240 taxis will service Olympiad participants and guests in the Ukraine's capital.

Right now the revision of routes and traffic schedules for suburban and intercity bus lines is being completed. All stop-point pavilions have been constructed or rebuilt, rest areas and parking places have been equipped, and technical servicing stations have been reequipped along the entire distance of the roads over which the cars of foreign tourists will travel.

In order to provide a high level of transport service for guests of the republic's capital, drivers and line personnel are attending special courses for raising their qualifications, and they are studying foreign languages.

Trucking Industry Problems

Frunze SOVETSKAYA KIRGIZIYA in Russian 4 Jun 80 p 2

[Article by R. Kul'matov, manager of the Transport and Communications Section of the Kirgiz Communist Party Central Committee: "Full Yield from Every Motor Vehicle"]

> [Text] In our mountainous republic, motor-vehicle transport has the leading role in freight and passenger hauling. The effectiveness of its work has been raised in recent years. At many motor pools rolling stock is being serviced on time, fuel accounting is being improved, and measures are being taken to fill out the drivers' ranks.

At the same time, there are still many deficiencies in the use of trucks.

"Personal" Trucks

Each truck should be operated with a full workload and used only for its designated purpose. In practice, however, this requirement often is violated. In some kolkhozes and sovkhozes trucks are being used as...personal vehicles. Farm managers are legitimating this unlawful situation. For example, at Kolkhoz imeni Shevchenko (the chairman is Comrade Breus and the party committee secretary is Comrade Burgabayev) of Dzhangi-Dzhol'skiy Rayon, seven trucks were assigned to the chief engineer, veterinary workers and OTF [sheep-husbandry department] manager. At Sovkhoz Seydykum (the director is Comrade Makhmudov and the party committee secretary is Comrade Kalgarov) of Bazar-Kurganskiy Rayon, trucks were allocated for trips by the chief agronomist, the chief engineer, the kindergarten manager and a division manager. At Kolkhoz imeni Frunze (the chairman is Comrade Abduvaitov and the party committee secretary is Comrade Murzakulov) of Naukatskiy Rayon, the chief engineer uses a fuel truck, the livestock-complex manager a milk truck, and the OTF manager a GAZ-66 truck, for official trips.

At the Sovkhoz imeni Kuybyshev (the director is Comrade Mula-Akhunov and the party committee secretary is Comrade Musayev) of Alamedinskiy Rayon, kilometerage of the truck for official trips of the chief veterinarian in just 20 days was 3,400 km, and gasoline consumption exceeded 1,000 liters. The chief livestock specialist rode more than 1,200 km in 20 days on a milk carrier, the chief veterinarian 475 km in 9 days. The "record" goes to the vehicle assigned to the OTF. The department's specialists found a way to "spin" 2,300 km in 9 days. All the kilometerage consisted of empty runs!

Truck transport is used irrationally also at Kolkhoz Chayek of Dzhumgal'skiy Rayon, Kolkhoz Moskva of Suzakskiy Rayon and Sovkhoz Kyzyl-Suu of Keminskiy Rayon.

At some farms proper attention is not paid to reporting motor-vehicle operation and to signing for fuel. At the Kolkhoz Kumushtak (the chairman is Comrade Varkhalinskiy and the party committee secretary is Comrade Toykinov) of Leninpol'skiy Rayon, for example, reports of measured distances between farm facilities are lacking. The kilometerage is not being reported on trip logs.

The lack of monitoring lessens people's feelings of responsibility and creates favorable soil for misuse. Thus, during the first quarter, 209 drivers who used trucks for personal profit purposes were arrested. Some of them had driven outside the republic. For example, driver Ya. Romanov of the VAZ [Volga Motor-Vehicle Plant imeni 50-Letiya SSSR] Automotive Center was hired to deliver apples to Omsk in a powerful KamAZ truck. And driver V. Motorin of Frunze Motor Pool No 7 headed for Barnaul and driver P. Akinin of Kirgizvtortsvetmet's motor pool went to Balkash with that same freight. Many such examples can be cited, unfortunately.

Nor can one be reconciled to the fact that certain drivers leave state vehicles at their houses at night. This is possible only where proper monitoring and reporting are lacking. During a check, "household" parking lots were found at Kolkhoz imeni Frunze of Naukatskiy Rayon, Kolkhoz imeni Rakhmandzhan of Leninskiy Rayon, and Sovkhoz Sovet of Sovetskiy Rayon.

All this is reflected negatively in motor-vehicle utilization effectiveness. An analysis of the technical and economic indicators of motor-vehicle fleet operation by kolkhozes and sovkhozes that were checked indicated that the yield per listed motor-vehicle tonnage is 30-40 percent of the corresponding indicator achieved by common-carrier automotive transport. Although the motor fleet's utilization factor is fairly high--73-80 percent, the kilometerage with loads remains comparatively low. This indicates that very many trucks are making nonproductive empty runs. Last year 10,200 vehicles were found that traveled without freight and over great distances. In January of this year there were 263.

It is the duty of party organizations and of farm managers to wage a decisive drive against the irrational use of automotive transport. The work must be so arranged that each vehicle works with a high yield. For this purpose it is necessary, first of all, to establish the strictest monitoring and to arrange for active reporting.

Vehicles Standing Idle

The highly productive use of transport depends directly upon its operating condition. But at some farms proper significance is not attached to the maintenance and upkeep of the vehicle fleet. At the Sovkhoz imeni Tel'man (the director is Comrade Begaliyev and the party committee secretary is Comrade Mambulatov) of Panfilovskiy Rayon, a check indicated that 16 out of the 46 available motor vehicles had spent a long time in repair. At Kolkhoz Yaroslavskiy (the chairman is Comrade Ibramaliyev and the party committee secretary is Comrade Konopolyanikov) of this same rayon, 22 of the 48 motor vehicles were idle in the garage awaiting repair, and 9 of them had been there more than 8 months.

At Kolkhoz Put' k Kommunizmu (the chairman is Comrade Musakulov and the party committee secretary is Comrade Gayduk) of Sokulukskiy Rayon, 17 of the 52 motor vehicles were being repaired, 6 of them having been undergoing renovation now for more than half a year. The situation was no better either at Kolkhoz imeni Shopokov, Kolkhoz imeni XXI Parts"yezd, Kolkhoz imeni Lenin, and Sovkhoz 50 Let SSSR of this rayon, or at Sovkhoz imeni Kuybyshev of Alamedinskiy Rayon, and Kolkhoz imeni Kalinin, Kolkhoz Zavety Lenin, Sovkhoz Iskra and the MSO [Interkolkhoz Construction Organization] of Kantskiy Rayon.

Technical servicing and customer-ordered repair of vehicles at motor pools of the republic's Minavtoshosdor [Ministry of Automotive Transport and Highways] (the minister is Comrade Orozaliyev) are performed unsatisfactorily. The stations and lines are not completely equipped, have not been provided with [illegible] and have not been completely manned. Fastening and lubricating operations in garages are performed manually. Out of 70 farms, only 10 operate diagnostics stations. On most of the flow lines the installed equipment does not provide for an objective evaluation of the condition of the vehicles, assemblies and components.

As a consequence of weak exactingness on the part of the ministry and the irresponsible attitude of many motor pool managers, schedules for planned-preventive repair have not been made up, an accounting of kilometerage is not made, or, if it is made, there are substantial discrepancies for all vehicles. Technical servicing is performed in violation of the standard periods. In just 10 motor pools of the Przheval'sk Lead Automotive Transport Enterprise (the director is Comrade Akamataliyev) and the Northern Automotive Operations Trust (the manager is Comrade Boobekov), 510 of the 640 vehicles, or 80 percent, were idle for customer-requested repair on the day of a check.

The work of intermediate level warehouses is organized poorly, and they are not being supplied with the serviceable assemblies, components and parts that are available at central warehouses. At most motor pools there is no precise organization of the production line's output. On the day of a check, 120 out of the 608 motor vehicles, or every sixth vehicle, came off the line after 10 hours instead of 8. Trucks were sent to loading points in violation of the schedule. As a result, long lines are created during loading and unloading work. Machines are idle 17-20 percent of on-the-job time.

The Ministry of Automotive Transport and Highways is not doing enough work to improve the organization of intercity hauling of freight. Containers, pallets and packaging are being used extremely poorly. Not in one city of the republic have rational express routes planned by electronic computers been introduced.

To Satisfy the Agency's Interests

An analysis indicates convincingly that agency-owned transport is being used especially poorly. In order to put a good face on the situation, the managers of some motor pools go to all possible lengths, including exaggerated reporting.

Thus, in seven organizations of the republic's Ministry of Construction (the minister is Comrade Kuznetsov) 36,300 tons of freight and 532,500 ton-km were overreported, exceeding the actual amounts 2.4-fold. Through this "forgery," motor vehicle bases illegally obtained 36,300 rubles and wrote off 31.7 tons of fuel. The Rybach'ye SMU [Construction and Installing Administration] (the chief is Comrade Yavkin and the party organization secretary is Comrade Poskochin) especially "distinguished" itself. In 7 months here, hauling was overreported by 12,300 tons of brick and 6,900 tons of concrete and mortar. The administration unlawfully paid out 11,600 rubles to the motor-vehicle base.

The Ministry of Construction has not organized constant centralized control over the operation of automotive transport, even at major freight-organizing points, and the responsible officials, in order to avoid responsibility for untimely loading and unloading of motor vehicles, do not indicate in the documents the time spent on the loading operations or they indicate much less time than was actually expended. In the past year, because of the absence of layover time on commodity-transport invoices, motor-vehicle bases exacted from construction organizations 16,200 rubles in penalties. It was written off as operating costs for the output produced, and the guilty have not been brought to account.

And where layovers have been reported, they turn out to be much shorter than the actual layovers. For example, at facilities of the Stroyindustriya Trust (the manager is Comrade Kuznetsov and the party organization secretary is Comrade Burkinov), according to the transportation invoices, layovers in November supposedly totaled 2,700 hours. But time-keeping records indicated that the vehicles were inactive 1.5-fold to 2-fold more.

Because of the low degree of organization of repair work in Minstroy [Ministry of Construction] motor pools, many reserves for increasing freight-hauling are being lost. The reinstatement of transport is being conducted mainly by the drivers themselves. The branch is not taking steps to reduce empty motor-vehicle kilometerage and the consumption of fuels and lubricants, and high kilometerages from the garage to the first reporting point and from the last point to the garage are being permitted. For example, empty runs during the year for daily delivery of vehicles just to mortar-and-concrete mixing facilities located in the eastern industrial zone of Frunze totaled 221,000 km and fuel consumption was 38.3 tons.

The Ministry of Construction is slow in introducing advanced hauling methods. Up until now the centralized shipment of freight from supply bases has not been organized, the delivery of small-item freight according to a schedule is lacking, and only five collectives are working under brigade contract.

These deficiencies are inherent also in interkolkhoz construction organizations of the Kirgizmezhkolkhozstroy [Interkolkhoz Construction Association of the Kirgiz SSR] (the chairman is Comrade Bychek). Very often exaggerated reporting of the amount of haulage is permitted here, and fuel consumption is being poorly reported and monitored. Such cases have been discovered in the [illegible] MSO (the chairman is Comrade Mamytov and the party organization secretary is Comrade Bakanov), the Tyupskiy MSO (the chairman is Comrade Abdukadyrov and the party organization secretary is Comrade Mambetaliyev), and the Alamedinskiy PMK [Mobile Mechanized Column] (the chief is Comrade Pavlenko and the party organization secretary is Comrade Ivzank).

At the Rybach'ye motor-vehicle base of Kirgizkolkhozstroy [Kolkhoz Construction Trust of the Kirgiz SSR] (the chief is Comrade Kuleshov and the party organization secretary is Comrade Kononenko) an elementary reporting of motor-transport work has not been provided for. Speedometer readings are not being monitored, and gasoline consumption is not being analyzed.

* * *

The [illegible] harvest campaign is approaching. Its pace and rhythm will depend greatly upon effective motor-transport operation. This was emphasized recently at the republic conference of managers of transport enterprises and organizations, ministries and agencies and of representatives of party and soviet organs. The necessity for intensifying monitoring over transport operation and for raising exactingness toward motor-pool managers for its assiduous application were pointed out. The economical use of each vehicle is an urgent task of the day.

KamAZ Customers

Moscow KOMSOMOL'SKAYA PRAVDA in Russian 24 Jun 80 p 2

[Article by R. Baleyev, T. Korsakova and N. Krivomazov (Naberezhnyye Chelny and Abakan): "KamAZ Is Picking Up Speed"]

> [Text] The urgent question is: who will use the vehicle, and how?

"Anatoliy Derevtsov's hand was perplexedly twirling his airplane ticket to Krasnoyarsk, which he will have to return to Aeroflot. It seems that he feels uncomfortable because he had dashed the hopes of various youths from different cities to win the Grand Prize--the 150,000th KamAZ truck. But the drivers--a generous people--were the first to congratulate the winner. And they handed him their drivers' prize: they had passed the hat and presented Anatoliy with a fat bundle of coupons for diesel fuel. Enough to get to the Yenisey!"

Thus the paper concluded the current reporting from the contest of the young drivers' skills that had been arranged by the administration, the KamAZ Komsomol committee and KOMSOMOL'SKAYA PRAVDA. But both the readers' letters that came to the editorial office and the numerous opinions of specialists indicated that discussion of the tournament should be continued.

Remember: it was just a bit more than 4 years ago, during the workdays of the 25th CPSU Congress, that the first KamAZ trucks visited the walls of Moscow's Kremlin. And now the 150,000th heavy-duty truck is being handed over to a Siberian lad, to a driver from a Komsomol shock-work construction project, Anatoliy Derevtsov! The vehicle will go to an area of gigantic construction. So much has been done during the days of the Tenth Five-Year Plan! And right now, in industrial departments, at construction projects, in the fields and in the livestock departments of farms--in all work collectives, they are now pondering the Eleventh Five-Year Plan. And they are doing this, without fail, after an evaluation of their previous work: what they have managed to do, what interesting innovations experience has brought, and what should be dispensed with. And so a word right here about the Chelny contest.

Before construction of the truck giant on the Kama began, the country's truck fleet consisted mainly of medium-tonnage trucks. It was the economists' opinion that a third of the trucks should be heavy-load trucks. Today, vehicles with the KamAZ insignia carry on their shoulders the major portion of the freight. Last year, for example, they hauled 40 percent of the economic freight of the Russian Federation and the same proportion of Kazakhstan's grain. The new trucks are described as going like hotcakes, everyone wanting them. But are all of the vehicles being used at full capacity, and how is this being achieved?

"Now I know the simplest method for obtaining vehicles over and above all the funds. To do this, one must be the country's champion among drivers, and take home the grand prize of the Kama," said chief of the Automotive Transport Administration of Krasnoyarskgesstroy [Trust for the Construction of GES's in Krasnoyarskiy Kray] Leonid Semenovich Kaulin' to the champion when he was met on Siberian soil. And the champion, A. Derevtsov, as happens on these occasions, smiled bashfully, and everyone interrupted with his opinion of the roads. In 8 days he had crossed the Volga, the Urals and Siberia; and now he was home. They asked him: How do you become champion? That is, what is important?--for indeed, tens of thousands of drivers and hundreds of thousands of them, soon should be working like the champion.

"Informally!" answered Anatoliy with a smile. "I--I and my comrades--were trained in our automotive administration."

"We consider that the KamAZ is like an airplane," says L. Kaulin'. "You do not give it a long leash. Education is necessary. Two years ago, on receiving the first lot of KamAZ's, we began with study. We arranged with the plant for experienced instructors and put 120 drivers of the Abakan Motor-Vehicle Column No 6, where the champion is working today, at desks. Indisputably, this has affected the quality of the work later. First, they learned theory, and second, along with the instructors, they broke the KamAZ's in. Those who had learned could readily teach others, transmitting knowledge like a relay baton. Our repairmen also studied, directly at KamAZ. Thus, close ties with the plant were established. It would have been impossible for us without the ties. And indeed, we also taught the plant to make better vehicles...."

And so we return to Naberezhnyye Chelny, to tell about the meeting of tournament participants with representatives of the chief designer's administration, which took place at the time of the contest, which lasted 3 hours without interruption.

The vehicle is young and it is for young people. When chief of the design office for brakes Yu. Matveykin took the floor, the drivers were concentrating as if they were about to do some complicated driving along a steep descent. Yuriy Ivanovich decisively raised his hand, requesting that he not be bombarded with questions yet: "I know it all, be patient and I will tell all."

We shall explain why the audience was lively. It goes without saying that the KamAZ's have an excellent braking system: it acts instantaneously and reliably. But it is exceedingly complex. There are some 20 control cocks. Experienced middle-aged drivers write to the plant and propose that it be simplified, since it is difficult for them to switch over to the new system. Alas, their proposals, which will facilitate the drivers' life at first glance, are not suitable. There is no path backward. The designer explained: the brakes meet all the requirements of the international standards, thanks to which the KamAZ has entered the international market. You do not leave the old familiar systems on such a machine, you do not keep them. Yes, progress often is accompanied by complexity. Learn. Get to work on the manuals, examine the diagrams. Modern vehicles require that the driver be even an engineer-driver. Production of the KamAZ's is, in essence, only beginning, and, when the association comes up to design capacity, 150,000 vehicles will come off the assembly line annually. So it is that they have to be steered by young people, since, in the specialists' opinion, it is easier to teach them what is new than to switch experienced drivers over and to retrain them.

It was just such drivers who came to the contest, youths of high technical sophistication, keen-witted and curious. It would be nice to raise all KamAZ drivers to that level. This also is a specific matter for the Komsomol committees of automotive transport enterprises.

The KamAZ's are being used better than was the case when other trucks were being mastered. Experienced operators who had, in their time, survived the "introduction" of various motor vehicles, in no way expected that this new vehicle would cause so little unpleasantness. But....

The habit of working the old way has not evaporated all by itself. For indeed, empty runs, uncoordinated organization of hauling and poorly thought-out runs for KamAZ's will lead now to enormous losses.

Here is what drivers--the participants in the contest for the Grand Prize of KamAZ--say.

S. Mar'in, brigade leader of a Komsomol-youth brigade of KamAZ drivers of Motor-Vehicle Column No 1540, from Volgograd:

"We work under the brigade contract. They have attached us to a plant that manufactures red brick; we haul clay from a quarry. Our equipment, the KamAZ vehicle, is, as they say, three heads above what is working in the quarry, where they have old excavators, which often break down. There are 14 vehicles and 28 drivers in the brigade. It happens that a fourth of the vehicles, which, perhaps, are needed someplace else, are idle. Yet they requisition all the vehicles, for an emergency they say, so it will be less tense...."

A. [illegible], driver of motor-vehicle column No 1201 from Krymsk, of Krasnodarskiy Kray:

"In the summer we carry barley, wheat, rice, tomatoes and green vetch. Everywhere there are lines: both at the grain-receiving points and at the canning combines. Right now much is being said about how drivers are operating on daily schedules during grain hauling in Saratovskaya Oblast. They tried to introduce schedules for us, but it did not work out. That means they must find out why it did not work out...."

As we see, the contest that brought the drivers together produced a discussion about effective operations far beyond the framework of one vocational department. Let us recall: it was just one second gained that gave Anatoliy [illegible] the lead in the contest and made him the winner. I would not like to compare the seconds of the contest to the long hours that KamAZ drivers lose at lines.

But such a comparison is necessary! The new KamAZ truck has scarcely been proven on the country's roads, and difficulties that are not minor have been encountered, as well as deficiencies in organizing automotive transport operations....Do the command "searchlight operators" know about them? And the contest poses this question on behalf of the five-year plan.

The KamAZ detachment, which still is not very large, is doing almost the same work that hundreds of thousands of other trucks are doing. And if the idle time of these most modern machines can be reduced by only 1 percent, what a great help that would be to the country!

The victory of champion A. [illegible] was "forged" in Abakan, at his own enterprise. And we have already told about the local system of vocational training. It is impossible, however, not to note still another important feature, when talking about the best young driver, about the sources of his success.

An automotive center has been built for KamAZ's in Abakan. There are warm cubicles in the garage. The vehicles are maintained here, so it is much easier on KamAZ drivers than on the drivers of other vehicles. What is special here, and should one be surprised at this?

There has been nothing [illegible] a success! By the time the Kama automotive giant has been born, AvtoVAZtekhobsluzhivaniye [Technical Servicing System for Vehicles of the Volga Motor-Vehicle Plant Production Association] was already in operation. Its special automotive centers were then servicing more than 8,000 motor vehicles daily throughout the country. VAZ's formula was, "design-sales-service," which corresponded to common interests in the best possible way. And the new truck also was in need of the same care.

...Right now KamAZ has [illegible] special automotive centers. Their functions have been greatly expanded in comparison with the original concept. Now

Special automotive centers not only supply vehicles with spare parts but they also repair components and assemblies and they are concerned with raising the qualifications of drivers, repair workers, engineers and technicians.

KamAZ's special automotive centers are experiencing today the difficult time of getting established. There are not enough equipment and spare parts. The premises allocated by the RSFSR Ministry of Automotive Transport resemble only remotely those that are required. The Siberians and those from southern areas who came to the contest complained each in his own way—about the confusion in the provisioning of fuel and special grades of oil. USSR Ministry of Petroleum Refining and Petrochemical Industry enterprises are slow in producing winter grades of fuel and lubricants.

The service for the operation of the KamAZ's at times lags behind the modern heavy-load truck. What can local Komsomol organizations do to help here? The contest participants replied: KamAZ automotive centers should become centers for Komsomol concern for effective use of the new truck. As a start, tournaments for drivers' vocational skills must be organized jointly with automotive centers in the republic, kray and oblast. Preparation for the contest and joint work with activity managers will suggest points of application of youthful effort to Komsomol organizations. But the main thing is that it will help to instill in each young worker the feeling of an enthusiastic and interested attitude toward the new truck, that is, a state approach to the matter. The contest, Grand Prize of the KamAZ, teaches this, and so does Anatoliy Derevtsov's victory at the tournament.

...He had arrived from Chelny to [illegible]. He rushed, so he did not say at the Chelny celebrations what he said at home. But it is an important thought.

"My dad was a driver," Anatoliy said quietly. "He did not, of course, even dream about the equipment that I have. But he liked his vehicle, and the liking was mutual. Understand, it is necessary to like our hunks of metal...."

And he spoke with a purely human love, similar to the heroes of the tales of Andrey Platonov, who understood nicely that one must have a feeling no less sensitive toward metal than toward an animal or a plant. For "...a vehicle is a delicate, defenseless, fragile being: in order to drive it correctly one must put all cares out of one's mind...so then the man can be added to the machine, and that after 10 years of perserverance."

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RAILROAD

DEVELOPMENT OF BAYKAL-AMUR MAIN LINE CONTINUES APACE

Siberia, Far East

Moscow ELEKTRICHESKAYA I TEPLOVOZNAYA TYAGA in Russian No 12, Dec 79 pp 2-4

[Article: "Siberian and Far Eastern Economics and Transportation"]

[Text] The economy of our country, being, as stressed in the new Constitution of the USSR, a single national economic complex, is expanding steadily and dynamically. The industrial forces of all the union republics and economic regions are progressing on all fronts, the standard of living is rising steadily and the cultural level of the Soviet peoples is improving, in whatever sector of the economy they work and wherever they live. Such is the socioeconomic policy of the Communist Party and Soviet government.

Certain fundamentally new aspects of the rapid development of the economic potential of our country also perfectly conform with this policy. In his report to the 25th Party Congress Comrade L. I. Brezhnev said: "...it is time to answer the question of improvement of methods of the comprehensive solution of great social, industrial and territorial problems. We need unified, centralized programs, embracing all phases of the work -- from planning to practical implementation." He was talking primarily about implementing a long-term comprehensive program of the development of natural resources, accelerated growth of industrial and agricultural production in regions of Siberia and the Far East and the development there of large territorial industrial complexes.

It is important to note that the economic regions where industrial forces have developed at a faster rate than in the country as a whole are singled out in each step of communist construction plans. Such was the case during the years of the first five-year plans, when the vast Uralo-Kuznetskaya coal and metallurgy base was created in the eastern part of the country in accordance with the GOELRO [State Commission for the Electrification of Russia (1920)] plan. And today the problem of the development of Siberian and Far Eastern economy is being solved on a priority basis.

The economy of the eastern regions of the country has a great future, and its prospects are difficult to assess completely even today. These regions have enormous fuel and energy resources, vast forests are concentrated here, deposits of ferrous and nonferrous metals have been discovered, all the conditions exist for the development of many energy intensive sectors of the national economy, they occupy a prominent position in the country in terms of water reserves and watershed area and have great wealth and vast expanses of arable land. Judging by this and based on a real accounting of our forces and capabilities, the Communist Party also cited the national problem of speeding up the economic and social development of Siberia and the Far East. In the present phase of the development of the economy and scientific-technical progress the government can appropriate the colossal capital investments, material and technical resources and the highly skilled people necessary for the indicated purposes.

It is important to stress that fulfillment of the needs of the national economy of our country in terms of fuel, electricity, raw materials and metal has always been a major problem for the government, but as was noted at the 25th Party Congress, this problem confronts us not because of a physical shortage of natural resources, but because their reserves are limited in the inhabited regions close to the industrial centers. In other words, balancing the resources of the eastern and western regions of the country is the best way to develop the national economy. Accordingly the eastern regions in this five-year plan should provide the entire national increment of oil and gas production, aluminum production and more than 90% of the increment of coal production.

Life completely confirms the correctness and the far-sightedness of the economic strategy of the Party, which calls for the accelerated development of Siberia and the Far East. In 3 years of the 10th Five-Year Plan the territorial-industrial complexes that have been built there have yielded the entire increment of oil and gas production, a significant fraction of the increment of electricity generation and coal, iron ore and tractor production. The rates of growth both of the raw material and of the processing sectors of industry in the eastern part of the country will increase in the future.

Of course, the very possibility of adopting the vast territories, of developing there industrial and agricultural production, developing the necessary cultural and living conditions for the workers is simply inconceivable without prompt, and better yet immediate development of a transportation network. This conclusion is convincingly confirmed by experience in the development of many economic regions of the nation.

One need only remember the tremendous importance of the Tyumen'-Tobol'sk-Surgut, Ivdel'-Ob', Khrebtovaya-Ust' Ilimskaya, Tavda-Sotnik, Asino-Belyy Yar and many other railroads in the development of new regions. They not only opened access to rich deposits of minerals, but they also provided

The most important [illegible] efficiency of the industrial [illegible] both the around-the-year operation [illegible] of the railroads, and their high economic [illegible] rolling stock, which is substantially lower in comparison [illegible] other types of transportation. Specifically these [illegible] are of the greatest importance for [illegible] responsible for its leading role [illegible].

The growth of [illegible] eastern regions of the country already in [illegible] increase of freight hauling operations of the [illegible] particularly in "east-west" [illegible] the westward traffic increased by approximately [illegible]. Now the Siberian and Far Eastern railroads are handling [illegible] network freight and 10% of the passenger turnover [illegible] more than 30% of the general shipment of such cargo as coal and [illegible] that many cargoes in the inter-region exchange [illegible] country with the eastern regions are hauled [illegible] and more, we can imagine the ton-kilometer [illegible].

The distribution [illegible] kinds of transport is also extremely characteristic [illegible] account for 90% in Western Siberia, more than [illegible] in the Far East of the combined freight [illegible] and marine transportation. The share of [illegible] regions is 10% and 18%, respectively. [illegible] marine and river transportation [illegible] everywhere in the eastern part of the country [illegible] transport is increasing and the delivery of [illegible] at a high rate. At the same time [illegible] the main form of transportation in [illegible] shipments of coal, crude, timber [illegible] raw materials and construction [illegible].

Embarking on a [illegible] industrial forces of Siberia and the Far [illegible] on railroad transportation. [illegible] the planning, construction and operation [illegible] connection, even during the determination [illegible] essential in the initial planning stage [illegible] prospects of the region along [illegible] analyze possible traffic streams [illegible] unpopulated regions of our country.

An example of [illegible] problems and of the [illegible] of the coordinated development of [illegible] construction of the Baykal-Amur [illegible] unique road precedes the comprehensive adoption of the vast right of way region, which is the most rational and effective approach to the economic development of new lands. The abuilding trunk line has already begun operation and the adoption and utilization of the natural resources that are concentrated in the zone will begin as individual sections are delivered for operation. This is exemplified by the shipping of coal from the Neryungrinskoye field and the construction there of an enrichment plant and a large GRES.

In other words, the very construction of BAM [Baykal-Amur trunk line] gives impetus to the development of industry and the development and utilization of natural resources. Speaking to the builders of the line during a visit to regions of Siberia and the Far East, Comrade L. I. Brezhnev said: "Soon new industrial complexes will be built in these krays by human labor. BAM will promote the more complete utilization of the fabulous storehouse of the depths of this region and will provide a new solution for the problem of industrial development. This program is of tremendous importance to the government."

It must be said that both BAM and the existing Transsiberian line will play an important part in the development of external economic relations between our country and the countries of the Pacific Ocean basin, Southeast Asia and the Indian Ocean. Also promising are international transit shipments, in particular in large cargo containers, in Europe-Far East commerce. In the last 8 years alone the volume of these shipments has increased nearly 50-fold. Finally, it is clear that as the new regions of Siberia and the Far East are developed there will be even greater prospects for the development of international trade relations between the USSR and foreign countries, and the railroads of the eastern part of the network will play an even greater role.

Speaking of the prospects of the development and the improvement of the operation of the Siberian and Far Eastern railroads, it is important to emphasize that workers of many scientific-research and planning-technological institutions and specialists of planning organizations are already working on these problems. Of course, all the problems are being examined in coordination with the general prospects of the comprehensive economic development of the region.

Much work remains to be done. But life is already posing completely defined problems in this region, many of which are discussed in a book by the Minister of Railroads, I. G. Pavlovskiy. The book is entitled "Problemy i perspektivy razvitiya transporta" [Problems and Prospects of the Development of Transportation] and is being prepared for release by Izdatel'stvo Transport. It will be released in the national series "Razvitiye narodnogo khozyaystva rayonov Sibiri i Dal'nego Vostoka" [Development of the National Economy of Regions of Siberia and the Far East]. It examines existing and presumed economic relations and volumes of shipping, will give a description of the transportation network of the eastern regions of the country. will show the importance and prospects of the development of individual kinds of transportation, will shed light on the technical outfitting and features of operation of the railroads and explain the importance and capabilities of BAM.

We have already talked about the great prospect of the growth of shipping on roads of the eastern part of the network. To be more specific, according to an assessment presented in the book, the situation will unfold in the following manner. Traffic on the Siberian and Far Eastern railroads will expand at a faster rate in the 11th and 12th Five-Year Plans than in the country as a whole.

Mineral fertilizers and construction materials will be shipped in great volumes, and shipments of the machine-building, metal processing and chemical industries and of consumer goods will increase. The proportion of shipments of petroleum, timber and grain products will decline a little in the future.

In his book I. G. Pavlovskiy devotes considerable attention to the prospects of development of transportation in regions of Siberia and the Far East, especially to problems of expanding the railroad network. As we mentioned earlier, it will be necessary in this connection to examine the problem of new railroad construction, expansion of the traffic capacity of the existing lines and acceleration of scientific-technical progress as a whole.

We consider it essential to reduce considerably the load on the Main Siberian line. At the same time it will be desirable in the very near future to complete its electrification, and also to electrify the Central Siberian line between Barnaul and Zolotaya Sopka, the Irtysh-Omsk and Peski-Kurgan sections, the Kustanay-Pavlodar-Tselinograd section of the Southern Siberian line, the heavily trafficked Nazyvayevskaya-Tyumen'-Sverdlovsk line and others.

As is known, the natural and climatic conditions of Siberia and the Far Eastern regions, the great burden on the lines and the steadily increasing speeds of trains place special requirements on the technical condition of the rolling stock and transport machinery, and also on operating conditions.

As for the locomotives, there is a perfectly obvious need to design and build them in the arctic execution with the highest degree of dependability. The main requirement on these locomotives is that they provide failure-free operation of all units and assemblies at ambient temperatures of from +40°C to -60°C. The units that operate in the open air must meet the requirements of GOST KhL. This standard takes into account features of BAM and other railroads, which are operating or will be built under such conditions as complex right of way plan and profile, steep grades of up to 18% on mountain pass sections, many curves and tunnels, sections of road in permafrost regions, heavy train weights, etc.

Experience shows that the bearing structures of the rolling stock must be manufactured from more cold-resistant low-alloyed steel than is being used at the present time. It will be necessary, in particular, to manufacture cast automatic couplers from this kind of steel. Rubber products that are used in locomotive cabs and brake equipment and for insulating electrical wires must be made of frostproof grades of rubber, assuring stable operation at temperatures down to -60°C. A host of additional requirements on locomotives for Siberian and Far Eastern roads is related to the need to reduce the dynamic actions on the traction motors of locomotives, to improve the protection of electrical traction machinery from moisture, dust and snow, to increase the friction between locomotive wheels and the rails, improve the performance of automatic brakes, incorporate remote control of diesel electric locomotives for multiple unit operation, improve working conditions for locomotive crews, etc.

The question of the utilization of gas turbine locomotives on roads of the eastern part of the network is a special one. Gas turbine locomotives with a sectional power of up to 12,000 hp may, in principle, satisfy operating conditions on these roads. Many questions related to the development of such locomotives and establishment of normal conditions for operation and maintenance remain to be answered, but this problem should not be postponed for very many years.

Of course, the implementation of the mentioned plans and suggestions will require a certain amount of time and resources. But haulage on the Siberian and Far Eastern roads will increase with each passing day. Under these conditions there is a perfectly obvious need to make more complete utilization of existing traffic capacities of the lines, locomotives and all systems and facilities. In other words, the efforts of the railroad builders must be directed immediately to the disclosure and utilization of new reserves for improving the transportation service for the rapidly developing economy in the eastern part of the country.

As is known, the railroad system, including in the east, is working under stress. This is related not only to the inadequate development of the network and technical systems, but also to a great degree to the imperfection of the work planning system and scheduling deficiencies. Comrade L. I. Brezhnev brought attention to this at a conference of the first kraykom and obkom secretaries of the CPSU for the Far East on 6 April 1978. Comrade L. I. Brezhnev's instructions and recommendations are of exceptional, fundamental importance for the successful solution of many problems associated with improvement of railroad operation, not only in Siberia and the Far East, but all over the country.

As for the railroad workers of the Western Siberian, Kemerovo, Krasnoyarsk, Eastern Siberian, Transbaykal and Far Eastern roads, they are faced with many important problems in the present stage of economic development of the eastern regions, in the final year of the 10th Five-Year Plan. They are short on both experience and initiative. It is important that all capabilities, forces and resources be mobilized so that the plans of the Party aimed at the comprehensive accelerated development of regions of Siberia and the Far East will be implemented.

Speaking of the capacities of the Siberian and Far Eastern railroads, it is appropriate to mention that the railroads of this part of the network have machinery that is technically better in terms of many indices than the network on the average. They have 20% more electric locomotives in operation, many lines operate on the more efficient alternating current, and they have a [illegible] times higher level of automatic train traffic control. Several hundred main line electric and diesel electric locomotives and switching locomotives, as well as many units and assemblies for them, were delivered to the eastern roads in 1977-1979. All of this, along with leading experience and progressive technology, facilitated the attainment of higher operational and economic indices and improvement of the quality and effectiveness of work. The level of labor productivity on area roads was nearly 32% higher in 1978 than the network average.

In a word, the Siberian and Far Eastern railroads have considerable capabilities. At the same time the Party and government favor them with much assistance and concern. The answer to this is inspired labor in the name of transforming our eastern regions into a kray of highly developed industry, science, culture and social progress, into a gleaming kray of our great Motherland.

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Deputy Minister's Views

Moscow ELEKTRICHESKAYA I TEPLOVOZNAYA TYAGA in Russian No 12, Dec 79 pp 10-13

[Article by V. T. Kalinichev, chairman of board of directors of BAM construction, deputy minister of Railroads: "Progress of BAM"]

[Text] The construction of the Baykal-Amur trunk line has proceeded at accelerated rates from the outset.

In 1978 alone the volume of earthmoving operations was more than 45 million cubic meters. About 500 km of grade have been prepared for laying. A total of 500 km of main line have been built, 270 bridges and culverts constructed and about 2,000 meters of tunnels and about 2,500 meters of adits have been dug. At the same time homes have been built at Tynda, Urgal, Murtygit and other stations.

Hundreds of kilometers of highways have been constructed.

General Secretary of the CPSU Central Committee and chairman of the Presidium of the Supreme Soviet of the USSR, Comrade L. I. Brezhnev, addressing electors of the Bauman electoral district of Moscow on 2 March 1979, said: "Vast regions of our Motherland are changing their appearance. Extensive development of Western Siberia, which already has become a main fuel and energy base of our country, continues. It seems that only yesterday work began on the construction of BAM, and today trains are already rolling in working motion on a third of that line."

The Lena-Tynda section between Lena and Nizhneangarsk (with the construction of a detour through the Baykal range) and between Tynda and Il'gakan is in operation. More than 500 km of main line have been laid in that section. A total of 400 km of rails have been installed in the Bam-Berkakit section, and that made it possible to begin the industrial delivery of Yakut coal and to speed up the construction of the Neryungrinskiy industrial complex, since the necessary construction materials are being delivered not by trucks over the rough Aldano-Yakut highway, but by rail.

More than 500 km of steel have been laid in the Tynda-Komsomol'sk section. In 1979 work began on the construction of the Far East Izvestkovaya Urgal-Komsomol'sk railroad circuit, which is over 850 km long. This provided a better solution to the problem of train traffic on the Khabarovsk bypass and provided an opportunity to regulate rolling stock turnaround during the organization of work on the electrification of Arkhara-Khabarovsk sections. Since the beginning of construction more than 1,600 km of rails have been laid, more than 2,500 km of highways and 750 large and medium bridges have been built, including across such great rivers as the Amur, Amgun', Gilyuy, Kirenga and Lena. More than 6 km of tunnels were excavated under exceptionally difficult conditions.

Work proceeds on a wide front on the construction of the biggest bridges across the Vitim, Zeya, Olekma and Selemdzha rivers and on the reconstruction of a bridge across the Amgun'.

Special attention is being devoted to the construction of the Baykal (6.7 km), Severo-Muyskiy (15.3 km) and promentory tunnels north of Baykal (6.5 km). No less than 5,000 meters of main tunnel and 5.5-6 km of adits were earmarked for construction in 1979. Track will be laid on the Tynda-Chara section to Chil'chi station, 230 km from Tynda. More than 210 km of railroad will also be laid on the eastern section from Tynda to Komsomol'sk.

It is planned to speed up work in Severobaykal, Tynda, Urgal centers and settlements and on the construction of a locomotive facility at Komsomol'sk-na-Amure station of the Far Eastern railroad.

Emphasis will be placed this year on the allocation of resources for engineering support facilities (boilers, sewer and water supply systems, energy and communications facilities and engineering networks) in order to elevate the level of integration and to reduce incomplete construction on the line from end to end. Appropriations have been increased substantially for the construction of facilities that will assure reliable operation from the time they are placed in operation. These are primarily locomotive and car depots, road shops, signal and communications systems, freight depots, warehouses and also homes, schools, day care centers, clubs and other facilities, necessary for normal living conditions for operating personnel.

For Tynda center alone appropriations for the development of communications and energy distribution systems and industrial buildings and installations are being increased by 25%. Appropriations for the construction of locomotive facilities are being increased by 40%.

The first section of the Baykal-Amur trunk line, Bam-Tynda, has marked its second year of continuous operation. It is being operated by the director of construction and is an independent subdivision of the Ministry of Railroads. The Komsomol'sk-na-Amure--Berezovka line is being administered by the Komsomol'sk department of temporary operation of MPS [Ministry of Railroads].

In addition, the Ust'-Kut, Tynda and Urgal temporary operation departments of Mintransstroy [Ministry of Transportation Construction] have been established, and they will oversee operations on the Lena-Nizhneangarsk, Tynda-Berkakit, Tynda-El'gakan, Tynda-Dipkur and Alonka-Urgal-Suluk sections with a combined length of about 1,000 km.

It did not take long to organize and staff enterprises and stations of the Bam-Tynda line, which were able to meet the government's plan on freight haulage and their socialist obligations. The freight plan of 1978 was fulfilled to 113.1%, including 179.2% timber, and the freight turnaround exceeded the quota by a factor of 1.7. Hauling of coal from the Neryungrinskiy cross section of the Yuzhno-Yakutskiy coal complex started in December 1978. The quota of profits from freight haulage was exceeded and the cost of shipping was reduced. Rolling stock utilization indices were met: the mean daily travel of locomotives was 107.2%, and productivity was 108.9%, and train weight was 13.4% higher than the quota. This was promoted by the opening of the Purikan-Anosovskaya pass section, which made it possible to increase the scheduled train weight by 1,000 tons, which in turn made it possible to free five locomotives every day.

Traffic to Tynda and beyond to Berkakit is increasing every month.

The staff of dispatchers, in cooperation with locomotive crews, is trying every month to increase the acquisition and delivery of cars to Bam station. In 1978 the acquisition for Bam station from the Transbaykal road was fulfilled by 109%, and delivery by 108.5%. The technical and section speed increased substantially, the utilization of locomotive crews was improved and cases of violation of their normal productivity were completely eradicated. Passenger and freight trains, as a rule, roll on schedule. This is promoted by high speeds on runs, excellent maintenance of the track in many town districts and continuous improvement of the technology of stations and approaches.

The locomotive crews came to the Baykal-Amur trunk line from various railroads, primarily from the southern and western roads, where weather conditions are substantially better. The crews by and large were experienced, but they were inadequately prepared for operating trains under the severe freezing Siberian conditions with winds and snow. In that kind of weather braking conditions are complicated and visibility is much worse. In the summer conditions are also complicated due to frequent fog and rain.

The All-Union shock detachment of young railroad workers, numbering 570 people and headed by the Lenin Komsomol prize laureate and machinist Boris Vatyushanin, arrived recently on BAM to operate the Tynda-Berkakit line.

The Bam-Tynda section also has a rough profile. The prevailing even grade is 14%, the odd grade is 9% and add a lot of sharp curves.

On this difficult section it was necessary from the very outset to use TE2 diesel electrics, which are not suitable for such difficult conditions, not to mention the fact that they are rather obsolete. But these diesel electrics serviced segments of the Transbaykal road around Bam and it was not desirable to bring in the new series without a maintenance base. M62 and TEM2 diesel electrics, which have proved themselves excellently in operation under the severe Siberian conditions, were used for passenger traffic and for switching and marshaling operations.

Test trains were run in January 1978, and the tests made it possible to establish the weight quota of trains and to develop braking procedures under conditions of low temperatures.

After having opened the new section and developed train operation procedures under the severe conditions of the arctic, depot supervisors, engineering technicians, machinists and their helpers adopted the experience of the Sol'vychegodsk railroaders, who work steadfastly and move trains on schedule under arctic conditions. The experience of the Mogochin and Skovorodino machinists of the Transbaykal railroad was also adopted. A school of leading experience on efficient train operation on the section was conducted during the very first weeks of operation. Machinist instructors V. P. Deveynis, V. A. Smagin, N. I. Samokhvalov, machinists A. I. Levchenko, P. A. Skakalin, V. M. Retyunskiy and I. I. Ryabov shared their experience and instructed the young people right on the runs, demonstrating efficient operation techniques to them.

The depot supervisor strictly enforced locomotive operation procedures and speed limits and the activities of public traffic safety inspectors.

Special attention was devoted to the brake systems and observance of diesel engine temperatures during operation in low temperatures. There were problems in that the new section was accepted with serious deficiencies on the right of way. The number range exceeded 900 points, there were more than 40 warnings of speed limits up to 15 km/hr in effect on the section and the average speed limit did not exceed 35 km/hr. Electrical centralization of semaphores and signals was not completed, and therefore traffic was controlled by telephone; there were other problems, which were corrected during the process of operation.

Work under such conditions demanded of the locomotive crews maximum attention during operation and more careful observance of locomotive operation and maintenance procedures. The Lunino service method became very popular among the locomotive crews. Every passenger locomotive and switch engine was assigned to a crew, who took part in the operation of TO-2 and TO-3 engines. Without a maintenance base the only logical measure to assure high performance reliability was to hold the crews responsible for strict compliance with locomotive operation instructions, have them participate in technical servicing and encourage an especially careful attitude toward the machinery. Machinists I. I. Ryabov, P. V. Vasil'yev and others initiated competition for excellent maintenance of machinery under BAM conditions.

Making extensive utilization of the experience of leading workers of the railroad network in application to their particular operating conditions, the staff of the Tynda locomotive depot, in cooperation with their neighbors -- the Skovorodino railroaders, achieved a considerable overfulfillment of operational indices and socialist obligations. The technical speed quota was fulfilled by 112.5%, the average train weight by 113.8% and locomotive productivity by 104%, and the freight turnaround assignment was significantly exceeded.

Much attention is being devoted here also to fuel economy. During the beginning of operation, in connection with a lack of experience in train operation under the difficult conditions of BAM, a 160-ton fuel overconsumption for the depot as a whole was permitted. There also seemed to be a poor knowledge of the right of way profile, trains were operated on the section inefficiently and there were many underweight trains.

Generalizing the experience of leading machinists and analyzing the causes of fuel overconsumption, the engineering technicians developed mode charts of efficient train operation and calculated the differentiated critical weight quotas in terms of the limiting runs of the section.

Creative cooperation on the part of workers of the Tynda locomotive depot, department of locomotive economy and computer technology laboratory of the Khabarovsk Institute of Transportation engineers played a deciding role in the development of the mode charts. Test trains were run and scientists of the institute, using a computer, calculated efficient operating parameters. This led to a 600 ton increase of train weight.

A thermal engineering conference, held in Tynda, examined the results of the work that was done in terms of fuel economy and generalized the experience of leading machinists G. F. Sadkovskiy, A. I. Levchenko and F. V. Vasil'yev, who do not permit fuel overconsumption.

A fuel commission, approved by the conference, including depot supervisors and industry leaders, heard at their meetings explanations of machinists who waste fuel, attentively examined deficiencies in their work and gave specific recommendations on how to improve the train operating mode. And the result came soon -- in 1978 a substantial (4.7%) fuel saving was achieved.

Workers of the Tynda locomotive depot are making preparations to open the Tynda-Berkakit line. Special measures have been developed, which call for teaching the mechanics to run trains efficiently. The repair technology for 2TE10 diesel electric locomotives in retooled shops was developed on the line even before it was delivered to the Ministry of Railroads. Much work remains to be done on the adoption of new operating and locomotive repair conditions. It will be necessary here in the current year to organize in new facilities the repair of TO-3 and TR-1 locomotives by new workers, run test trains and determine critical weight standards, equip locomotives and other jobs.

In accordance with the organizational plan of the locomotive service of the Baykal-Amur trunk line in relation to the Lena-Nizhneangarsk-Muyakan section, the main Severobaykal'sk depot will be equipped with electric locomotives, the Muyakan-Tynda-Komsomol'sk section, about 2,500 km long, and the Bam-Tynda-Berkakit section, 430 km long, will be equipped with diesel electric locomotives at the main depots of Chara, Tynda, Zeysk, Urgal and Komsomol'sk. The Tynda, Urgal and Komsomol'sk depots are planned for carrying out lift repairs of locomotives (TR-3), and all the other depots for performing all forms of service and repairs except those that involve hoisting.

There will be nine depots on the BAM for the technical servicing and equipping of main line locomotives and switch engines, and there will be 14 recreation facilities for the crews, accommodating a total of 660 people. The Lena, Severobaykal'sk, Tynda, Urgal and Komsomol'sk depots are already under construction.

Routine maintenance of electric locomotives (TR-2 and TR-1) and technical servicing of the diesel electric switch engines (TO-3) assigned to the depot will be performed at the main Severobaykal'sk electric locomotive depot. The main Severobaykal'sk depot, with a construction space of more than 200,000 cubic meters, will consist of a series of shops: technical inspection (TO-2), fitting and settling, minor periodic repairs (TR-1) and major periodic repairs (TR-2), machine shops, a three-story administrative and residential building for 1,200 people, an indoor 84-meter washing and blowing stall with a service-industrial room, fitting installations with a diesel fuel warehouse, lubricant warehouse, raw sand warehouse, sand driers with a capacity of 120 cubic meters per day, and a dry sand silo. Technical inspection (TO-2), fitting and settling of electric locomotives will also be carried out in enclosed heated rooms, operating on the Lena-Severobaykal'sk section and assigned to the Lena depot. At the Lena station plans are also being made to expand the existing locomotive depot with the construction of a TR-3 barn and shops.

The living quarters of the locomotive crews who service line locomotives on the Lena-Severobaykal'sk section will be built at the Lena and Severobaykal'sk stations. The locomotive crew change point, with a 60-bed hotel, will be erected in Kirenga. Fitting, technical servicing and settling of turned over electric locomotives of the Severobaykal'sk-Muyakan branch will be done in enclosed warmed shops of the Muyakan turnaround depot, where there will also be fitting, technical servicing and settling of turned over diesel electrics of the Chara-Muyakan branch. A complete complex of fitting facilities for electric and diesel electric locomotives is planned for the Muyakan depot. It will have a sand drier with a raw sand warehouse, a dry sand silo, a lubricant and diesel fuel warehouse with enclosed service gantries. The change and rest points of the locomotive crews will be built at the Uoyan and Muyakan stations.

The main Chara locomotive depot will build TO-3 and TR-1 diesel electric locomotives that service the Chara-Muyakan section and double-engine Chara-Khani section, and also for routine maintenance (TR-1 and TR-2) of switch engines and technical servicing and fitting of diesel electrics of the Tynda depot.

An industrial shop building with a service and social building for 850 people, and a complete complex of fitting installations will be built for the Chara depot.

For servicing switch engines and marshaling locomotives of the Kuanda-Syul'ban section there will be depots for technical inspection, fitting, settling with a service and social building, fitting installations, a dry cleaning and laundry shop, and a hotel for locomotive crews.

In accordance with the organization of locomotive servicing on the Baykal-Amur trunk line the main Tynda depot will service the Tynda-Chara, Tynda-Skovorodino and Tynda-Berkakit sections, with a total length of more than 1,000 km. The depot will also perform technical inspection and fitting of locomotives of the Zeysk depot, which turn around on the Zeysk-Tynda section.

Three small technical servicing and fitting depots for diesel electric switch engines with the necessary facilities (diesel fuel, lubricant and dry sand warehouses) will be built at the Dipkun, Fevral'sk and Eterkan stations of the Tynda-Urgal section.

Locomotive crew exchange points with rest facilities for 60 people are planned for the Dipkun, Tungala and Eterkan stations. Living quarters for the locomotive crews who service train locomotives are planned at the Tynda, Zeysk, Fevral'sk and Urgal stations, and at the Fevral'sk station, where there is no main depot, a service-social building for 300 persons will be built for the locomotive crews.

The Urgal-Komsomol'sk section will be serviced by diesel electrics of the main Urgal depot, which will perform technical inspection, fitting and technical servicing (TO-3) and routine maintenance (TR-1 and TR-3) of assigned locomotives and technical inspection and fitting of diesel electrics of the Fevral'sk depot.

At the Komsomol'sk station there will be reconstruction of the existing locomotive depot and construction of a routine maintenance shop for TR-3 locomotives and of a separate standing building of the fitting, technical and preventive inspection shop with machine shops and an administrative-social building, fitting facilities (a dry sand silo and diesel fuel warehouse with a fueling gantry).

A technical inspection and fitting depot for diesel electric switch engines, combined with a shop for repairing uncoupled cars and service-social facilities, fitting facilities and a hotel for locomotive crews, will be built on the Tynda-Berkakit section.

The target task of the current five-year plan is to place into permanent and temporary operation more than one-half of the rails of the main line. Consequently there will be a need to organize the operation of isolated sections of the Baykal-Amur railroad.

According to the technical plan the Eastern Siberian and Transbaykal and Far Eastern roads will be responsible for the continuous operation of sections of the Baykal-Amur trunk line. However, the Bam-Tynda section will be turned over to the BAM construction director. The first results indicate that the decision to turn over the operation to the director is justified, since it will also make it possible to correct many deficiencies in construction planning.

There is a need already to draft a plan of permanent operation of sections of the line. The development of a separate railroad is not excluded. In connection with the fact that sections of BAM will be placed in operation as soon as they are ready, the final locomotive operations schedule, as set forth by the technical plan, is not acceptable. Several intermediate versions should be worked out in consideration of cooperative permanent and temporary operation by the BAM construction director and Mintransstroy.

In April 1978 General Secretary of the CPSU Central Committee, Chairman of the Presidium of the Supreme Soviet of the USSR, L. I. Brezhnev, during a trip through Siberia and the Far East, assigned concrete tasks to the builders and operators in relation to acceleration of the construction of sections of BAM. In carrying out L. I. Brezhnev's instruction, the builders and operators will successfully fulfill higher socialist obligations in relation to the early delivery of the line.

The volume of capital investments that will be appropriated for construction will increase substantially in 1980, and the spending of these appropriations will make it possible to deliver next year the new BAM--Berezovka--Komsomol'sk-na-Amure section, which is 199 km long.

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Low Temperatures

Moscow ELEKTRICHESKAYA I TEPLOVOZNAYA TYAGA in Russian No 12, Dec 79 pp 41-43

[Article by Candidate of Engineering Sciences N. L. Fuks, chief of Electrification Service and Energy Economy of Eastern Siberian Road and V. S. Narozhnyy, chief of Service Department: "Contact Network of Low Temperatures"]

[Text] Problems of the operation of the contact network under low ambient temperature conditions down to -50 to -55°C must be solved every winter. In the 10 years since individual sections were electrified experience in their solution has been accumulated there and on the road as a whole.

In spite of careful preparation of machinery for winter and inspection during the transition period, there usually remain among the tens of thousands of units and elements several that are vulnerable and unprepared, and which show up in severe cold. Every year, the first time the temperature falls to minus 35-40°C, especially when it happens suddenly and sharply, a series of breakdowns of the contact network, which are especially characteristic of winter weather, occurs on the road in a period of 1-2 days. But eventually, after these less reliable elements are eliminated, the operation of the contact network stabilizes.

During much of the winter (after the first freezes), the contact network of the road operates just as reliably as during summer, no matter how low the temperature plummets. That is the way it was on our road during the winter of 1978-1979. The operation of electricity delivery systems did not exert a negative influence on the operation of the road.

An analysis of the distribution of failures among the entire electrification and energy economy, recorded by RB [repair base] in 1976-1978 (on the

Eastern Siberian road before expansion) disclosed that there is no big difference in the reliability of electricity delivery systems between the months of the year. The number of failures during the last 3 years in the period of June-August was 62, and in the period of December-February it was 51.

This was accomplished by implementing preventive measures, worked out on the basis of long-term operating experience.

Damage data compiled over the years show that the weakest point of the half self-compensated suspension in low temperatures is the hanger assembly. Cracks in the hanger rod insulators (or in other metal parts of the hanger assembly, and that happens much more rarely) account for 60-70% of all failures of the contact network. Nearly every case is accompanied by a broken current collector of EPS [expansion unknown].

Right now it is very difficult to establish the primary cause of damage and to say with certainty whether it started with a spontaneous crack in an insulator, and whether the power collector would have failed anyway or whether something else would have happened at the same time, due to maladjustment of the hanger assembly and impacts of the power collector with the hanger rod. Much attention has been devoted to an analysis of these common and not so simple kinds of damage on the road.

It has been established in particular that although hanger insulators break at different times of the year, most of the cases (70%) occur at subzero temperatures. An analysis of cases by types of hangers disclosed that the frequency of broken insulators is about identical for direct and return hangers; they happen considerably less rarely on flexible hangers.

The distribution of damaged hanger insulators by month for the period of 1970-1977 is given in the figure [figure not reproduced]. As can be seen, December and January, the months of the lowest temperatures, account for a significant fraction of them.

Most such damage occurs on curved parts of the track, and the probability of damage increases as the radius of curvature gets smaller. Nearly half of insulator breaks (45%) occur on curves with a radius of 600 m and less. The frequency of damage has also been found to depend on the position of the hangers in relation to the boundaries of the anchor part (i.e., on the distance to the middle anchor). The length of the joint is approximately 10% of the length of the anchor part. At the same time, during the cold period 50% of all breaks occur on the cross supports. Then, as the support gets closer to the middle anchor the probability of damage decreases. The most unfavorable combination is to place the joint of anchor sections on a curve.

All these data and an analysis of the circumstances of many specific cases of damage disclose three, generally different (although occasionally combined) groups of causes of broken hanger insulators.

The first and most obvious is pinching of a hanger insulator in the lug of the bracket and inadequate mobility of the connection between the bracket and insulator. This cause is manifested when typical dimensions and the configuration of the lug are violated or when the height of the hanger bracket is not adjusted when it should be. The probability of damage is especially high when the current collector passes during drops of the ambient temperature. These cases are comparatively easily prevented by competent operation. In recent years they have amounted to not more than 10% of broken hanger insulators on the road.

The second cause is tightening of the auxiliary hanger rod against the main one, which pulls the assembly outside of the clearance diagram of the contact wire and causes the current collector to strike the hanger. This situation is possible at the lowest temperatures due to sharp tightening of the carrier cable of the half-compensated suspension and longitudinal displacement of the contact wire in relation to the carrier cable. The probability of damage increases as the distance between the fastening point and the middle anchor increases, and this can be the result of improper installation and adjustment of the droppers. These cases are more difficult to prevent than pinching of insulators, but it can be done.

The third and most frequent cause of broken insulators is the poor quality of IFS-27.5 rod insulators. After 10 and more years of operation internal cracks, defects and flaking of the porcelain appear on them. These phenomena obviously are promoted by careless handling of the insulators (they are dropped and tossed about) during installation. Repeated cyclic changes of the outside temperature, characteristic of regions of Eastern Siberia, create a high probability of insulator failure at the point of reinforcement and connection of the porcelain to the iron cap.

The difference of the thermal expansion coefficients of the mated materials evidently has an effect and causes insulators to break occasionally, even on flexible hangers -- in places where the mechanical load on them is minimum, and some additional stresses due to maladjustment are excluded. Time and again it happens that an insulator that is being replaced on planned schedule "crumbles" at first touch.

The natural reduction of mechanical strength plays a minor role in all cases of insulators that fail in operation.

The above analysis of the causes of damaged hanger insulators suggests a group of measures that should be implemented on the road to prevent broken insulators. The first and most effective of the measures is careful daily monitoring by personnel of the condition of hanger assemblies, especially during the coldest temperatures and after the sharpest one-day drops.

Daily inspections of the contact network by station chiefs and electricians are being organized at this time along the entire road. Special attention is being devoted to the absence of pinching of hanger insulators in the bracket lugs and to the observance of the necessary distances between the contact wire and main hanger rod on every support. Problems that are found are corrected immediately by adjusting the height of the hanger brackets. The adjustment techniques under all conditions should eliminate impacts on the hangers.

Another technical measure is the installation of insurance loops ("reverse droppers") on return hangers. In many cases, particularly on straight sections of the road, they reduce the probability of broken insulators and prevent damage to the current collector, if a break is permitted. It is important that when installed the loops not be overtightened and have slack. Otherwise, at low temperatures they not only do not prevent an insulator break, but will promote it. To prevent this the loops, made of bimetallic wire, are partially bent into a spiral.

Experience has shown that an important requirement for preventing insulator failure on return hangers is to make sure that their main rods have sufficient cross section. On one of the just electrified sections we found that the main rods of the return hangers bent in cold weather and caused insulators to break. Therefore they had to be replaced and reinforced immediately along much of the track.

Another way to improve the reliability of the hanger assembly is to use so-called double hinged loops instead of single hinged ones in the connection between the insulator and bracket, which virtually eliminates pinching of insulators. This part is being mass produced in the railroad electromechanical shops of the Eastern Siberian road, and they are being installed routinely on electrified sections. The urgency of this measure is already recognized by many roads of the network, although it still is not included in the list of typical parts of a double hinged loop (ear).

Replacement of IFS-27.5 insulators will also become an inevitable measure under the developing conditions, especially in places where they have been installed for 10 years or more. In this regard it will hardly be wise to replace them with the same grade of insulators, but of more recent production. PFoV plate type suspension insulators are being installed on rod insulators instead of flexible hangers, and the stronger and more reliable IKSU cantilever insulators are being installed on other assemblies.

The conversion to IKSU insulators is being carried out primarily in hanger assemblies located in curves smaller than 600 m in radius and on the joints of anchor sections. The more extensive adoption of these insulators would be desirable, but that is being delayed by a shortage of them and by the great amount of work involved in replacement.

Considering that the increased pressure of a passing current collector also actively promotes the failure of hanger insulators at low temperature the road has instituted a rule that prohibits the travel of joined electric locomotives with two and more simultaneously raised current collectors on curves smaller than 600 m in radius at temperatures below -30°C. Work that has been done in these areas has made it possible in recent years to substantially reduce the number of hanger insulator failures -- the most characteristic of winter damage. The reliability of the contact network as a whole in low temperatures is thereby improved.

Among the other kinds of damage characteristic of winter, broken current collectors on trolley frogs have been a problem for us until recently. They occur due to maladjustment of the trolley frogs and relative displacement of the contact wires of the different branches when their tension is increased. These cases are especially common on the trolley frogs of DC sections, where the double contact wire intersects with the single wire. Based on the experience of a number of roads systems that lift the contact wires simultaneously have already been installed on many of these frogs.

In addition, individual cases of maladjustment of sectional insulators (of the Krapivin type or of the three-wire type that still remain here and there) with broken current collectors are also permitted. The replacement of all sectional insulators with glass-reinforced plastic ones, which, however, are being manufactured and delivered to the roads in insufficient quantities, is another effective measure in addition to improvement of the quality of adjustment.

Years of experience, constant monitoring of the condition of compensating systems and tension of lines have made it possible to virtually eliminate separations of the longitudinal elements of the suspension (contact wires and carrier wires) due to sudden temperature drops. Unfortunately, the same cannot be said about the lower hanger wires of cross beams at the stations. Separations of them or broken bored out insulators of the ISS type (the mechanical strength of which is also low, just as of hanger insulators) are still being permitted. The problem of fitting the hanger wires of cross beams with tension compensators still has not been solved.

Cantilever clamps and other steel elements of the contact network often failed in the past during deep freezes due to cold brittleness. A considerable amount of work was done to install insurance loops on the clamps, especially the anchor clamps. Such cases have not occurred in recent years -- the cold-brittle steel parts apparently got sorted out by natural selection.

While inspecting insulated cantilevers on sections of the road we came upon a fundamentally new kind of damage -- spontaneous failure of IKS-27.5 cantilever insulators. Although these cases are unusual they happen every winter. Their cause, in our view, is not related to any operational deficiencies and depends only on the quality of manufacture of the insulators and the difference of the thermal expansion coefficients of the materials of the rod and cap

Effective measures essentially have not yet been found. However, the installation of braces on insulated cantilevers is at best a half measure, which by no means always prevents insulator breakage.

The condition of the current collectors of the electric locomotive stock obviously is of special importance in cold weather. The relationship between the fact of contact network damage in winter and the condition of a passing current collector is not always obvious. Therefore, when temperatures fall to -30°C and below the contact network electricians must organize around the clock inspection and testing of the current collectors running on the line at all turnaround points.

There has long been a need to adopt automatic monitoring of the characteristics of current collectors. An instrument for this purpose was developed, in particular, at OMIIT [Omsk Institute of Railroad Transportation Engineers] (see "ETT," No 4, 1978), but it has not yet been adopted by the industry, and we have not been able to acquire it, even one for testing. Furthermore, the ZhT-72 lubricant, recommended by the Ministry of Railroads for use on current collectors in the winter, has not been delivered to our roads this year.

The problem of ensuring accident-free operation of the contact network in low temperatures is not yet completely solved. However, the experience that has been compiled, promptly implemented measures, strict observance of the winter preparation technology that has been developed (instruction TsE/3470) and competent and coordinated actions by the staff of electricians in cooperation with workers of other services of the road will enable us in the future to successfully cope with this important matter.

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RAILROAD

TRAIN TRANSFERS AT SIBERIAN JUNCTIONS HANDLED POORLY

Moscow GUDOK in Russian 11 Apr 80 pp 1-2

[Article by Correspondents V. Kurkov, V. Denisenko, V. Sbitnev, V. Seseykin and Ya. Zabara and Special Correspondents B. Zimting and G. Tkachev: "The Transsiberian Railroad's Junctions"]

> [Text] For a long time the Siberian and Eastern railroads have been working extremely unsatisfactorily. More than 60,000 surplus railroad cars are there. The railroads are not coping with the plan for dispatching freight: during the first quarter they fell into arrears to customers by several million tons of coal and timber. The transfer of trains through junction points of these arterials is especially unsatisfactory. It is far below the established goals.
>
> What is the cause of this? In order to discern the state of affairs locally, our correspondents visited all the main junctions of the Transsib [Transsiberian Railroad].
>
> So here is the story of one day--8 April. Reporting are V. Kurkov (Bolotnaya), V. Denisenko (Mariinsk), V. Sbitnev (Tayshet), V. Seseykin (Petrovskiy Zavod) and Ya. Zabara (Arkhara).

Bolotnaya: "Figure-Eights" Again

This railroad yard right now is the most difficult boundary point on the route of even-numbered train traffic. On the Novosibirsk Division alone the average daily surplus car fleet amounts to 1,300 cars. There is one cause--nonacceptance by the Kemerovo Railroad. During the first week of April there was not one day when the number of trains for Bolotnaya that was set by the operations plan was received. As a result, the difference during the week was 124 trains.

In examining the charts I sought out trains scratched from the timetable through the fault of the Novosibirskers themselves. And, it is honestly addition, I found: damage to an electric locomotive, a delay because of a heated journal box, and the track workers here had not been readied....

But here is what catches the eye on each chart--the capacious treads of the layover, and the awe-inspiring slope of the lines, but the "holes" are completely eye-catching. And in these gaps I saw, in all, two types of notations: "Nonacceptance by the Kemerovo Railroad," and "No brigades." These factors define precisely the entire picture of the interrelationships of the West Siberian and Kemerovo railroads.

On 8 April, there was acceptance but there were no locomotive brigades. On practically all days trains were scratched from the timetable for precisely this reason. However, judging by the final work results for the day, there were brigades. Even a surplus of them. The secret of this contradiction was uncovered gradually. When I called Kemerovo Railroad dispatcher A. Abramov from Bolotnaya and reminded him of Bolotnaya's request to send locomotive engineers "as passengers," he said: "We will not send them, there are no brigades. Let them accept the odd-numbered trains and turn the engineers around in the opposite direction without time off."

Yardmaster V. Logvinovskiy and I took a look at the charts. Bolotnaya crews take westbound trains freely, even when they are brought into contact with the Kemerovo Railroad by intolerably dense deadheaders. The engineers arrive with 3-4 hours of worktime, quickly change locomotives and head for home. However, then when we sum up the final results for the day, it turns out that 10 more trains have arrived at Bolotnaya from Taiga than were dispatched eastbound. This means there was a reserve of brigades.

But why then does yard controller I. Dudkevich make 13 notations in the first half of the day: "There are no brigades," and his daytime relief, B. Kravtsov, has already made 25 such notations? That is, 38 trains have been delayed. Later these trains left, but you do not recover the time. On the strenuous Transsiberian operation it is an almost hopeless task to make up for lost time. As a result, by the end of the day the number of even-numbered trains that had not been turned over builds up to 17.

But let's get back to the locomotive brigades. Why aren't there enough of them in Bolotnaya? Because they were those same deadheaders in the westbound traffic. Always next to the deadheaders in the charts are "holes," and there is free track in the yard and on the section's open line. But eastbound trains arrive uniformly at Bolotnaya. Nonregularity of the odd-numbered traffic causes disturbances here in the dispatch of oncoming trains. This is how the figure-eight is obtained.

The conclusion suggests itself. One cannot work at such a busy junction without extra insurance. It is obligatory to have five to seven reserve brigades here for exchange. And they had them, but they became "surplus" from the uneven arrival of odd-numbered trains and simply went home. Yard controller B. Kravtsov explained it this way: "If there will be no lack of engineers, we will saturate the section with trains and then another 'nonacceptance' will be written in the charts."

The matter is well known. Kemerovo Railroad controller A. Abramov confirmed this to me indirectly. I asked him: "How are the trains going from Taiga to Mariinsk?" "Poorly," he confessed, "we are dragging. Krasnoyarsk Railroad Yard delays acceptances for Mariinsk. Trains are double the norm on the section."

So the Bolotnaya controller was right. If there had been brigades to meet the demand, they would have quickly filled up the section from Bolotnaya to Taiga with trains. This is what complicated the picture at the Bolotnaya Railroad Yard on 8 April.--V. Kurkov.

Mariinsk: Now It's Full, Now It's Empty

I road a freight train to Mariinsk. Speaking honestly, I was resigned to a long trip, but for more than 100 km from Taiga we were "on green." But the closer to the junction yard, the more often the yellow light burned. We were barely dragging along. Nine kilometers before Mariinsk we stopped: the Krasnoyarsk Railroad Yard did not take us.

The 148 km had been conquered in 5 hours, versus the norm of 2.8 hours. But engineer V. Putrov was content. This can be understood, for on the average here it takes more than 7 hours. During the first quarter the section speed was reduced by 9.4 km. During the first week of April alone the Krasnoyarskers failed to accept 34 planned trains. The section from Bolotnaya to Mariinsk was filled to the brim with abandoned trains, and the Kemerovo Railroad was deprived of flexibility, so acceptance for Bolotnaya also was held up.

"There were no Bogotol electric locomotives, and a long train was in the way," answered yard duty officer Ye. Mishin to the question of why we were held up for an hour at the entrance signal.

"Out of 12 locomotives, at 1900 hours, there was only one at the yard," yard duty officer L. Kulilova confirmed. "The locomotive barn turns them out for deadheading: now it's empty, now it's full."

Thus, one of the main causes of nonacceptance of even-numbered trains at this junction is a shortage of Bogotol electric locomotives. In order to maintain the scheduled traffic volume during any period of the day, there should be no fewer than 13 AC locomotives. On these days there were: 13 at 1200 hours, 9 at 1800 hours, 7 at 0000 hours, and 6 at 0600 hours. Consequently, one cannot even speak about regularity of the junction's work. Turnaround for electric locomotives at the yard these days is 2 hours, 24 minutes. But the travel time from Bogotol is 2 hours, 17 minutes. The locomotives are idle too long. This occurs because no one asks about their retention.

On the morning of 8 April, when yard duty officer V. Ivanova went on shift, seven made-up trains stood idle for an hour and a half without electric locomotives. And where could they get them from if, from 0200 to 0500 hours, only 3 trains had arrived from Bogotol. It is true, another 4 were drawn up later, but they were used for passenger trains. And only after 1800 hours did the situation normalize somewhat. Taiga locomotive brigades began to return home from turnaround. The junction began to operate rhythmically; the train situation on the main run of the Kemerovo Railroad began to be corrected, and favorable conditions were created for accepting trains for Bolotnaya from the West Siberian Railroad.

Unfortunately, this was delayed briefly. As turnover time approached, the situation began to get increasingly nervous. It was not possible to recover from the slump that had been permitted at the start of the relief.

Almost 30 minutes before the end of the reporting day, V. Ivanova sat down at the chart of the movements performed, because it was no longer necessary to conduct the movements, only to "depict" them. And an experienced hand was necessary here....Everyone understood that this was not pretty, and they smiled wryly, but they did so, justifying themselves by the fact that, as is said, they all arrive, and one or two trains will be "borrowed" for the report.--V. Denisenko.

Tayshet: Cars Without Papers.

This day began with a curious phenomenon. When a train from Sayansk bound for Vikhorevka rolled into the yard, the recipients notices that its papers were from another train. Yard duty officer A. Volkov left it on the receiving and dispatching track, pending clarification of the circumstances. It was clear now that the train will not leave soon and that one of the junction's operating tracks had actually been shut down. This occurrence could not add optimism: on previous days the yard had not coped with the plan for receiving and dispatching trains. And on the 8th, the railroad division had assigned the task of receiving and dispatching four more pairs of trains than on the day before, not counting the exchange with the Abakan Division.

At the end of the previous day the railroad's division gave the order not to take traffic to the east--the railroad was supersaturated. Trains proceeded at great intervals. As a result, the yard could not accumulate the required number of locomotive brigades from the Ilanskiy Railroad Yard. The same thing had happened on 7 April. Because of a shortage of brigades, 4 odd-numbered trains were idled at the yard for more than 7 hours altogether.

In the first 3 hours, approximately, the yard received additionally even- and odd-numbered trains. There was no one to take trains to the west....

Still, the undocumented train remained and other matters came up. Until almost 1700 hours traffic from the east was not good. And prior to this there had been still another train without papers. This time on the part of the Ilanskiy Railroad Yard. It is true that in an hour and a half everything settled down, and the train freed the yard's tracks. But there were no brigades for dispatching even-numbered trains--none had been accumulated.

All the even-numbered traffic was artificially plugged up and traffic intensity dropped. The inspectors' operations were reduced.

"It is always like this," senior inspector A. Taygankov lamented, "if only you could get adjusted to a good rhythm, but there is nothing of the sort."

At night the shift of senior inspector Ye. Sergiyenko reported that again a train had arrived with damaged freight. It was necessary to uncouple the train, do some complicated switching and occupy track. More than an hour was spent on this. And indeed, six such trains turned up during the day.

Senior operator of the even-numbered fleet M. Makoshina told me:

"Uncoupling because of freight damage happens often. Up to 15 times per day. Since 3 April there have been more than 40 cases. And the yard's work results are worsened."

It is 0000 hours. Again there are no Ilanskiy brigades. Five trains stood motionless at the yard. In all, 10 trains were scratched from the schedule for this reason during the day. And about 40 during the week.

Before the shift ended it was found that the yard had sent out trains in accordance with the task but had received four fewer--eastbound routing had been held back.

"If it were not for all these mix-ups," said junction dispatcher A. Yastrebov, "all the trains would flow smoothly. There is a potential for it at the yard. What kind of work organization can we talk about if we deliberately hold back even-numbered traffic?"

But nevertheless, the day ended almost normally: the yard had accepted all trains and had sent one less to its neighbors over the mainline. The goal for the Abakan run was met.

The fast train Rossiya arrived last. It was going by relay to the east and it rolled into the junction's yard precisely on schedule--for the first time recently.--V. Sbitnev

Petrovskiy Zavod: When There Is No Cooperation

It is 1200 hours, Moscow time. The end of the reporting day. Dispatcher of the eastbound section A. Dzyuba put on the chart the last, seventh small red signal flag that signified that a train on an odd-numbered route will go by fast relay, and he began to wait for the final figure from the neighbor on the Zabaykal'skaya Railroad on the exchange of trains for Petrovskiy Zavod. To the question of how many of them there should be under the plan, the dispatcher nodded at the display board, where 7 bulbs burned.

"The reporting hour has already passed, and there's nothing yet about these seven trains," said A. Dzyuba. "Will they take them or won't they?"

Senior dispatcher of the Ulan-Ude Division B. Borisenko explained:

"At [illegible] hours they agreed to exchange a certain number of trains. In the morning the senior dispatcher of the Zabaykal'skaya Railroad and the managers of this railroad said they would take five more trains. Later, after the minister's teleconference, they committed themselves to turning over another five to us."

But an hour after the reporting time had passed, a new figure appeared that did not fulfill even one of the three control plans that had been exchanged during the day.

This is how it was on 7 April. In the morning of the next day, still prior to the start of work, two traffic-section chiefs, S. Shmelev from Ulan-Ude and B. Zhitikhin from Chita, exchanged opinions about the forthcoming exchange of trains. The latter again named the original figure, but added that perhaps there will be more, if there is "pressure from above." The East Siberians estimated that it would be possible to accept even 10 more trains for Petrovskiy Zavod.

And so we were sent by mail-and-baggage train to the junction. We went on schedule and counted the trains standing on the section with electric locomotives. It was explained: according to the schedule they should have arrived at the junction an hour earlier. Thus, on the section from Ulan-Ude to the Kizhi Railroad Yard, a distance of about 120 km, we had counted 8 such unit trains plus 5 that were left without locomotives.

We rushed through these kilometers in little more than 2 hours and pulled up at the semaphore at the approach to Kizhi. There were still 20 km before Petrovskiy Zavod. The rears of another two freight trains were visible ahead. Deputy senior dispatcher of the Ulan-Ude Division V. Molchanov sighed:

"Now it will take at least an hour to get to the junction."

And he was not mistaken. We moved with dozens of stops and, naturally, we arrived at the junction late.

The reception of even-numbered traffic on this day went at this pace: from 0300 to 0600 hours less than half as many were accepted as from 0600 to 0900 hours. Yard duty officer L. Kopytova said that only some of the main tracks up to the Karymskoye Railroad Yard were in operation, and that there was an average of 1½ abandoned trains at each yard.

But now the time for the turnover of trains had arrived, and the work pace rose sharply. By this hour it was three times as much as yesterday, the day before yesterday, and even for the whole past week, and the figures for receipt of even-numbered traffic were refined--first they named one figure, then they added on five trains and then another three. By reporting time 11 fewer trains had arrived, but acceptance was still continuing.

In the final 3 hours the yard accepted the main share of the trains. Each day there is at first a stirring into action, then acceptance increases, and then there is a real fever. It goes without saying that it is hard on the Zabaykal'skaya Railroad workers. They have a very large surplus fleet of cars. But where do 30 Ulan-Ude locomotives "take a stroll" along the railroad"? On 8 April, for example, only 1 out of 10 was returned from Petrovskiy Zavod.

Petrovskiy Zavod holds back the acceptance of trains because traffic on the Zabaykal'skaya Railroad is distributed unevenly. More precise planning of the transfer of trains between neighboring railroads and divisions is needed. And there is none.--V. Seseykin

Arkhara: Again They Do Crash Work

The Arkhara Railroad Yard should take 10 trains more than it transfers to its neighbors. But the tasks are not carried out. Meanwhile, many yard workers recall the time when they received many more here and did not experience any special difficulties in doing so.

"We work as constantly as possible," says yard controller V. Veremeyenko. "But unfortunately we do not have enough locomotives. Moreover, many of them are irreparable, and diesel locomotives are turned over for trains with extreme irregularity."

The junction actually is not operating smoothly. I became convinced of this after spending 8 April with carworkers, in the local carbarn and in the operations offices. During the day's first shift the yard was able to accept and transfer to its neighbors much less than had been prescribed. What was missed was left for the day shift to make up. And that shift rectified the situation to some degree.

And now the voice of an engineer is heard at the electrical centralized traffic control post:

"I ask that the train be made a little lighter."

"Why?" asks yard duty officer L. Natochiy.

"A motor has stalled."

The duty officer is disturbed. And this is not difficult to understand: if this were the only one, it would not be so bad. But that's just the point: already several engineers have asked that their trains be lightened. And the Zabaykal'skayers, as is stated in the norms, put together trains with a weight of 4,000 tons.

It is asked, why are engineers of the Obluch'ye locomotive barn so unwilling to take heavyweights? For they have new high-powered diesels of the 2TE10V series.

The whole trouble is that these locomotives led very quickly to an impasse in the park.

Half an hour passes and L. Satochiy has a new worry: V. Marchenko, whose locomotive should take a train from track No 22, cannot be found. He is not in the engineer's dining room or on the refueling track, and there is no answer over the radio. And this shuffling goes on for nearly the whole shift.

The carworkers also are letting people down. A train with coal arrived at 0650 hours on track No 19. PTO [technical servicing unit] workers detain it more than an hour. The yard duty officer communicates at times with carworker operator T. Alekseyenko, and each time he gives assurances that train No 2804 is being processed. Finally, at 0740 hours, the carworkers indicate that it is ready, and the train leaves eastbound.

I ask the yard duty officer to seek out PTO chief V. Davydov and find out from him what work the carworkers did. It turns out that they were not occupied with this train at all.

Reporting time is approaching. At the electrical centralized traffic control point there is tense expectancy: will all the trains be accepted today? The last minutes pass, and down below, on track No 2, a tank-car train is passing. The last one is accepted.--Ya. Zabara

Moscow, the Main Traffic Administration of the Ministry of Railways: There Are Achievements, But...

> At the same time that GUDOK's own correspondents were observing the situation on the main junction points of the Transsib, our special correspondents B. Zimting and G. Tkachev were in the main staff offices of the line--the Operating Instructions Section for Railroads of the Urals, Siberia and the East. The mission was the same--to find out the causes of unsatisfactory operation of the country's most important trunk line.

There was here today the usual businesslike situation. None of the nervousness that is characteristic when there are large interruptions of the traffic schedule. Deputy Chief of the Main Traffic Administration L. N. Godun also confirmed this:

"In recent days a remarkable rise in the passage of odd-numbered trains has been observed. Since a major operating breakdown on the East-Siberian Railroad, traffic has been normalized. According to the current situation for today, 8 April, we see that if the Kemerovo Railroad will accept trains for the Bolotnaya Yard in accordance with the operating norm, then normal traffic to the east will be possible. Now, in our view, the main thing for traffic supervisors is not to relax. The fact is that a tendency to indulge themselves has been noted on their part."

Let us examine the train situation on the railroads. The operations plan was carried out at all junction points. This was gratifying. However, the task of transferring even-numbered traffic that was set by the MPS [Ministry of Railways] board remained unfulfilled.

Meanwhile, there were opportunities for this, we became convinced, having ridden throughout the whole Transsib route. Confirmation of this is today's reporting by our correspondents. Realization of these opportunities up until now is being prevented by a lack of rigid control of planning of the movement of freight to the east, crosshauling, and a large number of operating breakdowns.

Here are the facts. At Sverdlovsk alone, through the fault of the locomotive activity, 13 trains were detained for 13 hours and 30 minutes on 8 April. Because of the negligence of carworkers here, two trains were scratched from the schedule for 2 hours. On the Kemerovo Railroad, locomotive trouble led to a delay of 5 freight and 2 passenger trains for a total of 7 hours. On the Zabaykal'skaya Railroad 7 trains stood idle for 13 hours.

Yes, as we see, there is no basis for relaxing. For indeed, the Main Traffic Administration itself and its Operating Instructions Section for Railroads of the Urals, Siberia and the Far East should strengthen discipline, struggle against parochialism and monitor fulfillment of the ministry's tasks.--B. Zimting and G. Tkachev, special GUDOK correspondents.

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LINE CONFERENCES' CODE, INTERNATIONAL RELATIONS IN SHIPPING EXAMINED

Moscow MORSKOY FLOT in Russian No 4, 4 Apr 80 pp 56-58

[Article by I. Averin]

[Text] International relations in commercial navigation in our day are experiencing the complicated and occasionally unhealthy process of rebuilding and becoming accustomed to the new political and social conditions of world economics. These occurrences have accumulated in world shipping during the whole of its history, even though the necessity of a search for uniform and universal standards of international association, in the broad sense of the word, was plainly formulated only in the last century.

The beginning was laid down in 1873 with the creation in Belgium of the "Association for Reform and Codification of the Law of Nations". After a little more than two decades, again in Belgium in Brussels, the International Maritime Committee (MMC) was founded as the new international institute for the stabilization of economic relations in commercial navigation. One of the founders of the committee, the noted Belgian jurist Louis Frank, in 1897 characterized the purpose of the MMC in the following way: "Our task consists of this: to give to the sea, which offers the natural connection between nations, all the advantages of a uniform law which would be rational, well thought-out, fair in its principles, and practical in its formulation."

The cited statement is interesting not only as an argument in favor of the creation of the International Maritime Committee. In essence, this is one of the first statements witnessing that without a universal and recognized-by-all unification of the standards for private legal relations, it is impossible to put in order and normalize international relations in shipping as a whole.

The International Maritime Committee accomplished much that was useful for the codification of international legal standards connected with the maritime transport of freight and passengers in foreign navigation. But the narrow limits of the activities of the committee, which amounted to reducing economic policy in maritime trade to the level of the commercial transactions of a shipowner with international clients, rather quickly exhausted itself. In the final analysis, the scantiness of that sort of approach stimulated an accelerated development of new trends in maritime law.

The national liberation movement in colonial and dependent countries in the post-war years led to the appearance in the world arena of a whole galaxy of new states. Their economic structure often still retains subordinate connections with former parent states, but history cannot be turned back. The need for just and authentically equitable international economic relations, including those in world shipping, in our day is acquiring all the more real meaning.

In the very first constituent session of the UN Conference on Trade and Development (YuNKTAD) [UNCTAD] in May 1964, the developing countries called into criticism the monopolistic practice of the cartels of shipowners associations, known in shipping under the name:line freight conferences. Further discussion in the working groups of UNCTAD about the nature of the activity of these international cartels revealed not only the economic damage which their uncontrollability inflicts on the interests of cargo owners, but also the serious discord in this field between the developing countries and the"traditional shipping nations" (the developed capitalistic states) striving to maintain the status-quo. However the efforts of the shipowners of the western countries to prevent adoption of an agreed international statement in this field turned out to be futile. In retrospect, it can even be said that the attempt in 1971 of the Council of European National Shipowners Associations (KENSA) to achieve acceptance of its own code of activity for freight conferences (prepared in the staff offices of the shipowning concerns in isolation from the political framework of present times) only hastened approval at the IIIrd session of UNCTAD (1972) of a resolution predetermining the development and adoption of a UN Convention on a Code of behavior for line conferences.

The countries of socialist cooperation gave substantial support to the position of the developing countries. A declaration issued by the delegations of members of SEV [Council of Economic Mutual Assistance] at the IIIrd session of UNCTAD stated: "The socialist countries, like the developing countries, insist upon the liquidation of the negative aspects of the activities of the line conferences of the capitalist countries (the closed, members-only character, loyalty contracts, and so on) and upon the full rights of participation in line conferences by shipping organizations and companies of all interested countries on the principles of nondiscrimination".

The necessity arose to become involved in earnest with putting relations in order in the economics of world shipping line transport. Although the shipowners usually do not admit strangers to their financial statistics, according to analyses of the most experienced economists, the total cost of the transportation of goods on the regular international shipping lines (basically, these are the members of almost 400 line freight conferences) fluctuates from 70 to 80 billion American dollars per year. A reasonable limitation of the super profits of shipping lines by a curtailment of their revenues by only 1%, means a gain of 700-800 million American dollars for cargo owners. Similar correlations of unjustified costs to consumers and excessive benefits for the shipowners of the capitalist countries, who control more than 75% of the world liner fleet, were the determining factors for placing strong delegations at the diplomatic conference which was opened in Geneva on November 12th 1973.

The conference was held in the complex circumstances stirred up by searches for compromise solutions for conflicts that frequently are hardly reconcilable. The Code of Behavior for Line Conferences adopted at Geneva contains, nevertheless, many progressive aspects - equal rights for the shipping enterprises of countries who are trading partners, the right of third flags to participate in the activities of line conferences, consultative procedures in the commercial area with the participation of representatives of the line conferences and so on. The fixing in the Convention of the formula for the distribution of cargo quotas among members of a conference in the proportions 40%-40%-20%,according to which the developing countries, as trading partners, receive the right to 40% of the volume of transport, should also be considered as an important regulation for the developing countries.

There is, finally, a dual interpretation in the Code and the document which can lead to conflict. All these elements already have been reviewed on the pages of the Soviet press. The conclusion is confirmed that the Code was not freed of a number of inaccuracies and that there is a remedy in the provision adopted earlier and included in the Convention, about the convocation of a conference for a survey of the practices in its application and the bringing in of appropriate corrections.

The Code has not yet come into effect because the criteria necessary for this have not been met. The total tonnage of the participants of the Convention must amount to not less than 25% of the world tonnage of ships for the transport of general cargoes and containers. Up to July 1979, 43 states including the socialist countries of NRB [the Peoples Republic of Bulgaria], GDR, Cuba, USSR and the CSSR adopted or subscribed to the Convention on the Code on the Behavior of Line Conferences. Not one state of the developed capitalist countries has ratified the Convention on the Code, and the mentioned 43 countries possess, according to Article 49 of the Convention, a little more than 17% of the necessary tonnage. Thus, the time the Convention goes into effect, to a large extent, depends on how quickly states subscribe to it, under whose flags the total registered tonnage is at least 8% of the world liner fleet.

Even during the diplomatic conference of 1973-1974, among the delegations of the western european states differences were beginning to appear in the approach to the principles of intergovernmental regulation of the activity of the line conferences. These differences were especially manifested in the points of view of the delegations of the countries who are members of the European Common Market. If the representatives of France, Belgium, and FRG announced readiness to accept the Code in the form developed by the Geneva Conference, then England, Denmark, Holland, and Italy announced a diametrically opposite and emphatically negative position. Japan, the Scandinavian countries and the USA also joined the"anti-Codists" as they later began to be called.

But the matter was not concluded by the disagreements in Geneva. On May 15, 1979, after several years of discussions, the Council of Ministers (for transportation) of the Common Market was able to approve rules for the ratification of the Convention on the Code by members of the EEC and also the wording of uniform reservations which each EEC member state must make with its deposit at the UN of a document of ratification or subscription to the Convention. The decision of the Common Market will, obviously, have far-reaching consequences and it is worthy of being dwelt on at greater length.

In reading the text of the three EEC reservations to the Convention on the Code, and a fourth reservation - interpretations of Article 3 - the first thing that strikes the eye is their striking variance with the purpose and principles set forth in the Preamble to the Convention. In this respect, the second and third reservations carry the greatest discriminatory matter. In essence, the discourse is a unilateral review of a number of the basic principles of the Code adopted by the Geneva diplomatic conference. Thus, in the reservation about Article 2 of the Convention, the EEC countries decided to revoke the regulations of this article for those line conferences that serve the Common Market. The specification on reciprocity of this article also will be invalid on regular conference shipping lines in transportation between countries of the Organization of Economic Cooperation and Development [OECD], of which 24 member states have capitalist economies. (In 1978, Yugoslavia joined OECD under a special agreement.)

In such a way, a significant number of the line conferences serving the trade of developed capitalist countries are removed from the sphere of application of the Code. For themselves, the line conferences retain their so-called self-regulation and that selfsame absence of control, for the limitation of which the Code was created. You see, Article 2 of the Convetion specifies such important elements for the activities of freight conferences as the equal rights of shipping lines of countries who are trading partners, the right of shipping lines of third countries to participation in 20% of the transportation encompassed by the agreement on a pool, the right of all members of a conference to participate in a pool, and so on.

It is true, the second part of the reservation of the Common Market about Article 2 of the Code says that it "-- must not affect the possibility of participation -- of the shipping lines of the developing countries --" in the transportation of Common Market cargoes, nor the shipping lines of countries who are members of OECD as regular lines of third countries; that is, cross traders. But on what conditions? It is here in these conditions that the discriminatory scheme of the authors of the EEC's reservations was laid down.

It turns out that if developing states can avail themselves of their rights according to Article 2 of the Convention on the Code in the capacity of a new regular line of a third state with all the ensuing rights within the framework of the 20% portion of the transport, then here another barrier is put up.

Thus, the entry of these shipowners into a conference of the ship-owning countries who are members of EEC or OECD is allowed on the conditions of Article 1(3) of the Convention where, as the criteria of acceptance of new members into a conference are: "an existing volume of tansport --- and prospects for its growth", conformity of the carrying capacity of the members of the conference -- "to the existing and prospective volume of transport", and also, " -- the affect of accepting a given shipping line into a conference on the efficiency and quality of the service of the conference." The emphasized reference to Article (3) amounts to this, that any of these criteria individually and all the more when taken together, foretell the denial of membership by shipping enterprises of the developing countries in those conferences where the shipowners of the developed capitalist states dominate. The closed and unregulated character of such shipowners associations is reserved to them themselves.

The EEC in general attempts to deny to the other participants in the Code not belonging to OECD or to the group of developing countries, for example, the socialist states, the basic fundamental principle of agreed international rights - the equality of all states - the equality of participants of an international convention. Such a conclusion suggests itself from the fact that in the decisions of the Common Market the principle of reciprocity is stipulated for members of OECD and for developing countries even if, on paper, declarative loop-holes remained, but for states who are participants of the Convention and who do not belong to either of these categories, the effect of the principal regulations of Article 2 of the Code unilaterally are annulled by the reservations.

Also very far-reaching is the EEC reservation on Articles 3 and 14(9) of the Convention, for in Article 3 of the Code, the equality is stipulated all members of the line conferences with the adoption by this [? sic] shipowners association of the pertinent decisions and also with the obligatory assent of the national shipping lines if it is assumed a decision affects the trade of their country. Now the Common Market has decided to nullify the effect of this article for the activities of the conferences serving the EEC (but with the condition of reciprocity) and in transportation between countries of the Common Market and other members of OECD. In such a way, in secret form they will give special rights to the main, the decisive members of the conferences from the EEC, and the rest are reduced to the level of second-grade partners according to the conference agreement.

No less resolutely, point 9 of Article 14 was abolished. This point prohibits conferences from introducing a new general increase of freight rates earlier than 10 months after the previous such increase. The reservation of the Common Market eliminating this regulation will affect equally the interests of shippers of the EEC, OECD, the developing countries, and all other participants in the Convention.You see, a significant quantity of cargoes are being transported by the conferences not only in througn service, but also in accordance with through bills of lading with transshipment in ports serving this or that conference only on part of the route.

For instance, cargoes from the USA shipped across the Atlantic with transshipment in Continental ports will be carried according to a freight rate arbitrarily increased by the members of the Common Market, and only on the rest of the way from the Continent to some developing country will the conditions of the Code begin to apply. The authors of the Common Market's reservations can be understood in the sense that the unpredicted jumps of currency instability create complications for shipowners in their countries, but it is difficult to agree with the attempts to place the burden of the disorders of their private financial systems on the shoulders of the other participants of the Convention and especially,the developing countries.

Curious also is the interpretation of Article 3 of the Convention approved by the Common Market for those cases where this article cannot be nullified, as was done in that just considered reservation, for example, in the relations with developing countries. In the final sentence of Article 3 it says that "-- the decisions on questions decided in conference agreements and touching on the trade between two countries cannot be adopted without the agreement of the national shipping lines of these countries". The EEC interprets this condition as an agreement of the national carriers of the trading states to a unified position up to the beginning of voting on the question affecting their trade. What does such an interpretation signify in practice? Most likely it signifies that the instrument of supplementary pressure is put on the developing countries in the interests of the EEC.

Even in this far from exhaustive evaluation of the contents of the EEC's reservations about the Code of Behavior for Line Conferences, there is a question which is important for the participants of the Convention; namely, what are the end purposes of the authors of these reservations and to what consequences can they lead?

As regards the purposes, here few variants for doubts remain. From all appearances, in the course of five years of discussions within the framework of the Common Market, the more conservative approach won out. It was aimed at retaining the dominating position of the shipowners of the Common Market and other so-called traditional shipping states in the international system of line freight conferences by any means, even at the price of infringing on the rights of other participants of the Convention.

It is difficult, finally, to suggest that the governments of countries who are already participants of the Convention on the Code should tacitly reconcile themselves with the discriminations foisted on them by the Common Market. In case of the ratification of the Code by the EEC countries with the reservations approved by their ministers of transportation in May 1979, the other participants will react finally in one way or another to the discriminatory attack. Governments can be expected to declare nonrecognition of the Common Market's reservations or still more drastic unilateral actions against the flags of the EEC in order to restore equilibrium on the basis of reciprocity. But by itself, the decision of the Council of Ministers (transport) of the Common Market in relation to the UNCTAD Convention on the Code of Behavior for Line Conferences signifies an important stage in the development of international relations in maritime world trade.

As a matter of fact, the EEC countries officially have declared their repudiation of the principles of the equal rights of flags participating in international shipping. Exhausting the arguments in favor of their "traditional and historic" right to dominate the situation in world shipping, they openly defended the path of protectionism that they themselves had condemned. The question is not about a shielded, forced, protectionist policy of one of the economically developing countries, but about the agressive protectionism of regional economic groupings of industrially developed capitalist states. Here is the operative formula: What was taken on the seaways in the colonial epoch is inviolable, and the access of newcomers into their private, regional maritime trade henceforth is forbidden.

If the decision of the Common Market is considered as a declaration of "war" with all the other participants in maritime world trade, or simply as a demonstration reflecting the processes of polarization of the international economic policy in shipping, the results of the approach of the EEC against equality of rights and mutually beneficial relations on the world's seaways is easy to foretell. The General Assembly of the UN simply expressed itself in its VIth special session, in favor of the establishment of a new order in international economic relations - an order based on justice and equal rights. In this, shipping as a branch of world economics is not excluded. The future belongs to the progressive standards of international rights and not to the survival of the past. Unfortunately, the snowball of accumulating confrontation in shipping has begun to gather speed on account of the initiative of the Common Market.

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FOREIGN PORT EXPENSES OF A SHIP RELATED

Moscow MORSKOY FLOT in Russian No 3, Mar 80 pp 16-17

[Article by I,Levin, head of a department of the currency and financial administration of the Ministry of the Maritime Fleet, and I. Starikov, candidate of economic sciences]

[Text] In some countries, the kind and quantity of cargo, its disposition, and also the quantity of ship's stores in double bottom tanks often influence the level of port fees.

This rule has substantial importance in the servicing of ships in the port of Alexandria (ARE) [Arab Republic of Egypt] where there are a number of fees; namely, in order of importance, tonnage, pilotage, lighthouse, and pier fees. The principal part of these fees is charged on the basis of the net registered tonnage of ships calculated according to special rules.

The administrations of ships visiting Alexandria must know well the rules for filling out the declaration on the inspection of spaces and double bottom compartments which are freed from fees,remembering that a judicious disposition of fuel, lubricating oil, and water in double bottom tanks have a large economic effect. One must remember that in this port, the calculated net registered tonnage consists of the permanent tonnage according to the special tonnage certificate for the Suez canal, and a variable tonnage depending on the use of the capacity in the double bottom tanks. One also must keep in mind that the variable tonnage includes the entire volume of any tank filled to a depth of more than six inches, regardless of its actual contents. The form of the invoices presented to a shipping company in this port complicates the verification of the variable tonnage because, in the summary statement of disbursements, the port administration's invoice for the principal fees is usually included without a supplementary declaration about the disposition of fuel and other stores. Therefore, to strengthen verification, captains of ships must fill out the declaration in several copies, one copy to be sent in to the finance and currency department of the shipping company. Some ship captains, in signing declarations or acknowledgements of pilotage, instead of the special registered tonnage, list the usual one - the one according to the measurement certificate.

According to local rules, that gives the port authority the basis for charging fees according to an unusually high tonnage. (For shelter deck ships the overstatement can amount to 70%)

In 1967 the USSR Register introduced a change in the "Rules of Admeasurement of Seagoing Ships" in accordance which, for newly constructed ships, all double bottom compartments not used for fuel, stores, or cargo are not included in the gross registered tonnage. This regulation was extended also to a number of ships already in operation, and that led to a change in their registered tonnage.

The recalculation of the registered tonnage of such ships led to the necessity of replacing the ships' measurement certificates with new ones. These changes,however, were not promptly reflected in Lloyd's Register which is used by foreign ship servicing agents in charging fees. For some of these ships, the discrepancy between the registered tonnage listed in Lloyd's Register and that on the ship's measurement certificate is very substantial.

The command personnel of ships should bring to the attention of ship servicing agents the change of registered tonnage and confirm these changes with the ships' measurement certificates.

The skilful use of the tonnage mark is an important resource for reducing ships' foreign port expenses. It is known that in accordance with the 3rd session of IMCO (the Intergovernmental Maritime Consultative Organization), a tonnage mark is placed on the majority of ships. This mark is calculated on the basis of the new principles of admeasurement and on the new interpretations of the concepts of "shelter decked" and "open" spaces. These recommendations of IMCO were recognized by the governments of a number of countries (Belgium, Denmark, Ghana, Holland, Great Britian, Spain, France, FRG, Japan and others). In addition, they recognize the tonnage mark certificates of Australia, Lebanon, and Nigeria although, officially, they did not adopt IMCO's recommendations. For a partially loaded ship, the correct and sound use of the tonnage mark can have definite economic effects. It is sufficient to note that the reduction of tonnage as calculated to the tonnage mark in comparison with the measurement certificate tonnage amounts, for ships of the "Leninskiy Komsomol" type, to about 2000 register tons; for ships of the "Beloretsk" type, to about 2160 register tons, and for ships of the "Bezhitsa" type, to about 1930 register tons. Therefore,in all cases when the tonnage mark is not submerged, ship captains should insist upon the charging of fees according to the tonnage mark, and, in case of a denial of this by port authorities or ship servicing agents, they should make a note of it on the documents so the shipping company subsequently can present a claim.

In a denial of the use of the tonnage mark by port authorities, it is necessary to present a written protest to the agent and to inform the shipping company. An official confirmation of the nonrecognition of the tonnage mark should be required from the ship servicing agent.

The correct filling out of documents plays a major role in curtailing the foreign port expenses of ships. The careless and untimely preparation of them creates the conditions for unjustified increases in fees.

During passage through the Bosporus straits for example, in accordance with the operative rules, public health formalities are carried out in which the ship's administration is obliged to list the net and gross registered tonnage according to the measurement certificate on a special public health acknowledgement. These data are put down on a registration card, on the basis of which, over a period of six months, the ship is charged lighthouse, public health, and pilotage fees.

An error in filling out these acknowledgements leads to excessive expenses during subsequent passages of the straits by the ship.

Ship captains must agressively demand to see the documents on expenses generated in foreign ports remembering that the absence of the captain's signature does not release the shipping company from paying the expenses if, in fact, the services were rendered. It should be kept in mind that in some ports, ship servicing agents are not interested in timely presentation of documents to the captain for signature but prefer to present them before departure of the ship, creating the possibility of additional sums in penalties.

Ship captains are personally required to sign money vouchers.

Substantial sums are charged in a number of foreign ports for pilotage duuring a ship's entry into a port, exit from it, and also in changing moorings or pulling a ship along a pier to a different berth. To lower these expenses, the participation of the captain in choosing a berth is of no small importance. Some captains rely wholly on the ship servicing agent,although in practice the participation of the captain in this matter,when he has a good knowledge of port conditions, permits selecting better conditions for processing the ship.

It is necessary to bear in mind that curtailment of the distance of pilotage, the number of mooring changes and berthing shifts, and the time of day of using pilots'services can have an important economic effect. This is especially important in the ports of those countries where the cost of these operations is high. In this it must be remembered that in some foreign ports there are pilotage fees which, as a rule, are charged according to a fixed rate depending on the registered tonnage of the ship. In this case, the captain must only draw up the primary document correctly, not allowing an overstatement of the tonnage. In those ports where piloting is not required, pilotage fees cannot be charged,as in this case the particular amount of piloting is paid for by the ship. In the first case the duration of the services does not play a significant role, but in the second case it is the determining factor of the level of the expense.

The choice of the time of day for carrying out pilotage, mooring, and other operations deserves special attention. Analysis of the principles and conditions of charging pilotage fees has shown that in all ports delay of the pilot on the ship after completion of the pilotage or the late ordering or specifying of his services leads to excessive expenses. Such cases are frequent. As a rule, in all ports the services of pilots, tugs, and moorings rendered outside of working hours, on Sundays or holidays,are settled at increases of 50% to 100%. Therefore, if possible, these operations should be done during working hours.

It should not be forgotten that in a number of ports, the administration deliberately tries to carry out piloting, mooring and other operations outside of working hours. The captain must be critically concerned with the chances of artificially increased expenses, and must study the complicating circumstances in the port and inform the shipping company, simultaneously giving a notice in written form to the ship servicing agent.

Lower expenses are possible also by a judicious use of tugs. For this it is necessary for the captain to know well the navigating conditions and the practices in the assignment of tug services. In those cases when the hiring of tugs in a port is obligatory, it is necessary to use them,endeavoring in the process to order tugs of the necessary power. To refuse tug services in such cases is to no purpose.

In ports where the hiring of tugs is not obligatory, one must proceed from the specific conditions of the pilotage. It is necessary to demand the rebates for tug services from the ship servicing agent where these are established in the agreements with the agent. In the concept of "services" the costs of hiring launches and automobiles, postal and telegraph expenses, the installation of a telephone on the ship, and other things are included. Although, individually, these expenses are not substantial, taken altogether they noticeably affect the total of expenses in foreign ports.

The level of the expenses in foreign ports depends to a significant degree on the correct choice of the ship servicing agent especially in the transport of the cargoes of foreign charterers. As a rule in chartering a ship, foreign charterers try to obtain the right of giving the servicing of the ship in the ports of unloading to their own agent. This not only complicates the management of accounts with ship servicing agents, but substantially degrades the servicing of the ship in those ports, and,as a rule leads to an increase of ships' expenses.

Inasmuch as in charters the totals of the payment on account which the agents of the charterer usually demand are not specified, claims in excessive amounts are presented to the shipping company. With nonobservance of these claims, the ship servicing agents refuse to fulfill a number of operations directly relating to the servicing of the ship such as supplying products and materials, the giving out of local money to the crew, and other services. Instead of a display of proper exactingness to such agents, [illegible] frequently resort to the services of a second ship servicing agent in the person of the ship's usual agent for which a supplementary, second agent commission must be paid.

The captains of detached ships,sailing without a charter,do not understand clearly enough its independent conditions and occasionally interpret them incorrectly. There are cases when the captains of ships, not knowing the terms of the transport or the procedure in registering an operation in a foreign port, sign documents for the fulfillment of services, but with a reservation about the corroboration of the shipowner; that is, pending the approval of the owner.

It must be remembered,however, that the signature of the representative of a ship on an original document about services rendered to the ship, serves as sufficient basis to pay the agent's account regardless of the presence of the reservation. Therefore, in case of doubt, the captain should communicate with the shipping company to ascertain the terms of the transport and only after this sign a monetary document.

In recent times a new plan to increase the personal interest of ship captains in reducing expenditures for pilotage(that would be achieved by way of the payment to them in foreign currency of some part of the total savings)has been receiving development.

By economies in the expenses of a ship that are well thought-out in all respects, substantial increases in the effectiveness of maritime transport operations can be achieved. One way of reducing expenditures is to steadily increase the seamens' knowledge about the problems of commercial and financial accounting operations.

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OCEAN AND RIVER

A SHALLOW-DRAFT TANKER FOR THE CASPIAN SEA

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[Article by M. N. Chemodanov and N. R. Gribanov]

[Text] In our country, construction has begun of 5000-ton deadweight, shallow-draft tankers for transporting all kinds of petroleum and petroleum products of the Ist, IInd, and IIIrd categories between Caspian Sea ports. (Figures 1 and 2) The personnel of the Volgograd shipbuilding plant have undertaken to deliver the first ship of the series - the "Oleg Koshevoy" - by the 110th anniversary of the birth of V. I. Lenin. The tanker is a steel, single-deck motorship with a forecastle and with a continuous double bottom and double sides. Its twin screw diesel-and-reduction gear power plant and cargo pump room are situated in the stern as also is the three-tiered deckhouse with living quarters. The ship is built to the Register of the USSR classification: KM*L3 /I/ A2 (tanker).

Figure 1. Model of 5000-ton Deadweight Tanker

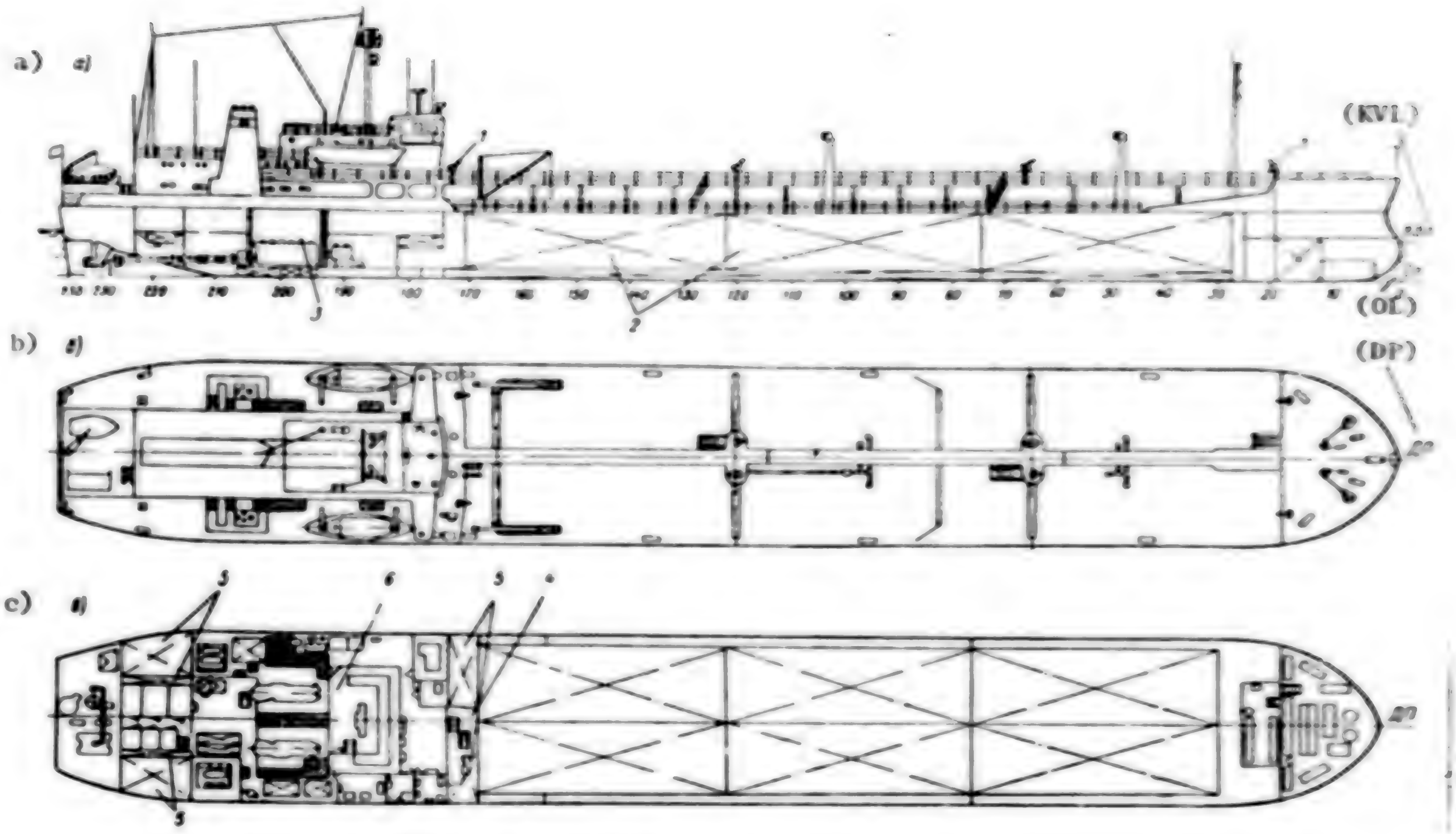

Figure 2. General Arrangement
a)Side view b)Plan view c)Hold

1. Fire-fighting monitor 2. Cargo tank 3. Machinery compartment 4. Pump room 5. Fuel tanks 6. TsPU [Central Control Station]
(KVL) - Design Waterline (OL) - Base Line (DP) - Centerline Plane

Principal Characteristics

Length overall	125.0 meters
Length between perpendiculars	120.5 "
Beam	16.6 "
Height at side	6.9 "
Draft to summer load line	4.2 "
Freeboard, with allowance for removable parts, and with 3-meter draft	14.5 "
Deadweight	5000 tons
Power	2200 Kilowatts
Speed, loaded	11.5 knots
Endurance	15 days
Crew	28

The hull has a transom stern, a simplified shape in the middle part, and a special form of bulbous bow. The deck is continuous, without sheer, and its camber is formed by two longitudinal discontinuities. There are bilge keels on the parallel middlebody.

The hull framing system is mixed. A longitudinal framing system is used on the bottom, tank top, deck, and on the longitudinal bulkheads in way of the cargo tanks. A transverse framing system is used on the remaining structure. To improve conditions for stripping, the tank top is inclined from the sides toward the centerline plane. To increase cargo capacity, the second [inner] sides of the tanks are sloped. The basic hull material is type 09G2 steel. Secondary structures and the deckhouse are made of VSt.3sp2 steel.

Widespread use has been made on the tanker of corrugated structures for the longitudinal and tranverse bulkheads of the hull, for the enclosures of the deckhouse, and so on. Among the peculiarities of the structure of the tanker, is the fact that there is no poop structure and no engine room casing. Instead of a casing, removable plates are provided along the sides of the main deck through which large size equipment, including the main engines, can be put on board.

Much attention has been given to the habitability of the ship. To reduce noise and heat radiation, the exhaust stacks for the main and auxiliary machinery are placed outside the limits of the living spaces. Cabins are situated mainly on the second tier of the deckhouse. All cabins and public compartments are airconditioned. The crew is accomodated in 12 single berth and 3 double-berth cabins having sanitary facilities, and 5 double-berth cabins having wash stands. The captain and the chief engineer have suites.

For loading and unloading petroleum products and for stripping the last little bit of cargo from the tanks, an integrated piping system was developed and combined with the hot-fluid tank heating system. A manifold is provided on deck out from which go two main pipelines serving the port and starboard tanks. From the main pipelines, branch pipes are led off into each tank. The branch pipes have gate valves in them which regulate the distribution of petroleum products in the tanks.

Through branches of the main pipeline, by means of a special pump or by one of the cargo pumps, cold petroleum or petroleum products are pumped out of the tanks, passed through a steam heat exchanger, and returned to the tanks. The inclined tank top and the presence of a trough on the centerline facilitate the stripping of cargo from the tanks. The small residues of cargo flow down along the trough to receivers situated at the after transverse bulkheads of the tanks. The cargo system is served by two 12NDsV vertical centrifugal pumps each delivering 600/850 cubic meters per hour at a head of 540 kilopascals [about 78 psi]. The operation of the cargo system is controlled from the station for control of cargo operations.

An assemblage of measures is provided on the tanker to protect the environment from pollution. The hull is divided into six cargo tanks having a total capacity of 5,900 cubic meters which are separated from the outer sides and the bottom by clean ballast tanks. The volume of the latter amounts to 2,735 cubic meters. There is a special tank with a capacity of about 40 cubic meters for the collection of bilge water. Sewage is collected in a tank whose volume is based on the duration of the ship's stays in sanitary zones. Waste water from basins, showers, and the galley is delivered to a tank whose volume is selected in the same way as for the sewage tank. To compensate for the change of trim of the loaded ship as fuel is consumed, liquid ballast is taken into clean tanks in way of the machinery space.

It should be noted that all outlets from the above systems are sealed. Delivery of sewage and waste water to onshore receivers is provided for by ship's equipment.

For collection of dry rubbish and waste from food products, containers are distributed about the ship. The separated residues of fuel and lubricants are collected in special tanks and then pumped out into shore receiving stations.

The ship is provided with water, foam and liquid fire extinguishing systems. The supply of water for the water and foam extinguishing systems is provided by two pumps with a total output of 260 cubic meters per hour at a pressure of 1 megapascal [about 142 psi] and an emergency pump delivering 40 cubic meters per hour. There is a system of foam fire extinguishing of medium expansion ratio. For delivering foam to the origin of a fire, monitors are provided at the forward end of the deckhouse, on the catwalk, and on the forecastle. The liquid fire extinguishing system is used for fighting fires in the machinery compartment, the TsPU [Central Control Post],and in the mufflers and spark arrestors

The complex of fire prevention measures includes electrostatic protection, metallic ceiling lattices, and fireproof panels made of asbosilit [asbestos silicate?] which are used for bulkheads between cabins and for the finishing of metallic surfaces.

The two main engines are type 64RPN 36/45 diesel-and-reduction gear units each with 1100 kilowatts of power at 252 RPM of the output flange of the reduction gear. The engines operate on either diesel or motor fuel. The provisions for automatic control allow the power plant to be operated underway without a continuous 24-hour watch but with monitoring of the operation of the mechanisms in the machinery space from the central control post, and without a servicing watch while at anchor.

The auxiliary power plant consists of four DGR 150/750 diesel generators of 3 phase, 400-volt, alternating current with a power of 150 kilowatts each, two KAV 1.6/7 auxiliary boilers each producing 1.6 tons of steam per hour , and two KUP 80/6-4 waste heat boilers operating off the exhaust gases of the main engines. There is also a 50-kilowatt emergency DGA 50-ER diesel generator of 400-volt, 3-phase alternating current. Electrical equipment operates from a 380-volt supply. Basic lighting is at 220 volts.

The propulsion and steering complex consists of two, 2.2 meter diameter, fixed pitch propellers and two double gudgeoned semibalanced rudders, the area of each being 9.3 square meters. To turn the rudders, there are two R16 electrohydraulic steering engines each with a rated torque of 245 kilonewton-meters [25,000 kilogram-meters]. A PU 130A thruster with a thrust of 16.7 kilonewtons [about 1700 kilograms] is installed in the bow. The anchor gear consists of two bow combination anchor and mooring windlasses, and two 2.5-ton anchors with 46 millimeter chain. There is also one stern anchor windlass with a one-ton anchor with 34 millimeter chain.

Lifesaving equipment includes two LT-30 tanker life boats with 30 person capacity, and two PSN-10M rafts for ten persons each.

Modern radio and electronic gear for external communications and radio navigation is installed on the ship including four radio stations (two of them are UKV), an emergency set, a radio direction finder, two radars, a gyro compass system and other equipment.

In developing the hull structure, great attention was paid to standardization of the elements of the shell, framing, sections, and blocks. The design envisages the assembly of the parallel middlebody from structural modules each of which is a completely formed part of the hull having a length of 6 meters and made up of standardized sections, subsections, subassemblies, and parts. The weight of the structures being assembled from the standardized sections and modules amounts to 53% of the weight of the entire hull. The standardization of sections and modules allows making several sections from a single drawing.

In the formation and building of the living spaces, a modular system was used. The accomodations of the ship are standardized, having a simple geometric form. The dimensions of cabins are divisible into a common dimensional module of 100 millimeters. For forming compartments, six standard size panels of asbosilit are used.

The installation of mechanical equipment is accomplished in the form of assemblages. Of the 15 assemblages installed on the ship, 12 are furnished by contractors, and there are 20 functional units made by the shipyard. In order to transfer the maximum amount of installation work from the ship to the shops and to reduce the period of construction on the ways, part of the functional units and individual mechanisms, equipment and piping are assembled into zonal units. The assemblages, functional and zonal units embrace more than 80% of the equipment, 45% of the fittings, and 30% of the piping of the machinery compartment,the planning of which was carried out by the volumetric method with the aid of a plant laboratory scale mock-up.

The new tankers to the maximum degree meet the demands for ships of the specific class and are intended as replacements over the next ten years for the well-known series of shallow draft tankers.

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